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ABSTRACT

This collection of essays on futurism is intended to open avenues for exploration, raise pertinent issues, and direct attention to new considerations. In "The Future: Implications for the Preparation of Educational Personnel," Dean C. Corrigan focuses on conditions that seem pertinent to development in future education and comments about two areas of change: the explosion of human interaction and the explosion of knowledge, accompanied by dramatic technological developments. In "Education Needed To Meet the Psychological Requirements for Living in the Future," Glen Heathers examines major features of changing society that are shaping the future, identifies the psychological demands these changes place on the individual, and lists types of changes in education needed to meet these demands. In "Whither Goest the Curriculum?" Louis J. Rubin makes recommendations for the curricula of the future after reviewing the ongoing disputes among theorists regarding the current difficulties of education. In "A Curriculum for Personalized Education," Robert G. Scanlon defines personalized education as a blend of the critical elements of individualized education, humanized education, and career education. In "Computer Technology: Key to the Future?" Harold E. Mitzel, stimulated by the slow-paced adaptation of computers to education tasks, discusses some of the incentives and constraints that operate on computer application to instruction. (PD)

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FORECASTING THE EDUCATIONAL FUTURE

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FOREWORD

That the future begins in our minds today is a critical message for educators. This publication is an outgrowth of a writing conference convened by the Clearinghouse, in collaboration with Research for Better Schools, to produce a publication on this important topic.

Joel L. Burdin, associate director, American Association of Colleges for Teacher Education; Richard A. Graham, research fellow, Brookings Institution; and John A. Dow, director of corporate development, Research for Better Schools, collaborated in conceptualizing and organizing the writing conference. Papers were presented by Dean C. Corrigan, dean, College of Education and Social Services, University of Vermont; Glen Heathers, resident scholar, Research for Better Schools; Louis J. Rubin, professor of education, University of Illinois; Robert G. Scanlon, executive director, Research for Better Schools; and Harold E. Mitzel, associate dean for research and professor of psychology, College of Education, Pennsylvania State University. "Critic-questioners" helped the persons who presented papers to revise them where discussion uncovered needed changes. In addition to the writers, and Graham, Dow, and Burdin, critic-questioners included Linda Brauner from the Philadelphia Public Schools; Ted R. Derr, director of curriculum, Potsdam, Pa. Public Schools; and Francis X. Sutman, chairman, Department of Secondary Education, Temple University.

The literature on futurism has become rich in recent years, and these papers inevitably touch on only a few facets, even in the field of education. A second publication is now being prepared for release early in 1975, which will deal with some of the questions not examined here.

The literature on futurism is varied and extensive. Much of it is profound and beyond the understanding of nonfuturists. Much is too technical and somewhat irrelevant for educators.

This publication is intended to provide useful information, understanding of futuristic processes, and ideas for infusing futurism into curriculum. If it contributes to a better understanding of futurism, its purpose will have been fulfilled. Education will be on the way to becoming more relevant and exciting as instructional personnel and students on all levels join together in shaping the future. Inventing the future today is the challenge.

You may do further research on this topic by checking issues of Research in Education (RIE) and Current Index to Journals in Education (CIJE). Both RIE and CIJE use the same descriptors (index terms). Documents in RIE are listed in blocks according to the clearinghouse code letters which processed them, beginning with the ERIC Clearinghouse on Career Education (CE) and ending with the ERIC Clearinghouse on the Disadvantaged (UD). The clearinghouse code letters, which are listed at the beginning of RIE, appear opposite the ED number at the beginning of each entry. "SP" (School Personnel) designates documents processed by the ERIC Clearinghouse on Teacher Education.

In addition to using the ERIC Thesaurus, RIE, CIJE, and various ERIC indexes, you will find it helpful to be placed on the mailing list of the ERIC clearinghouses which are likely to abstract and index as well as develop publications pertinent to your needs and interests.

For readers uncertain how to use ERIC capabilities effectively, we recommend the following materials which are available in microfiche and xerographic, or "hard," copy through the ERIC Document Reproduction Service: (a) How To Conduct a Search Through ERIC, ED 036 499, microfiche $.65; hardcopy $3.29; (b) Instructional Materials on Educational Resources Information Center (ERIC). Part Two. Information Sheets on ERIC, ED 043 560, microfiche $.65; hardcopy $3.29. Item "b" is available as a complimentary item, while the supply lasts, from this clearinghouse. The last page of this publication is an "ERIC Order Blank" which gives instructions for ordering materials and can be used for ordering.

—Joel L. Burdin, Director

February 1974

AN INTRODUCTION TO FUTURISM

> *I am not an advocate for frequent changes in laws and constitutions. But laws and institutions must go hand in hand with the progress of the human mind. As that becomes more developed, more enlightened as new discoveries are made, new truths discovered and manners and opinions change. With the change of circumstances, institutions must advance also to keep pace with the times. We might as well require a man to wear still the coat which fitted him when a boy as civilized society to remain ever under the regimen of their barbarous ancestors.*
>
> *Thomas Jefferson, from a letter to Samuel Kercheval, 12 July 1816*

Futurists not only accept Jefferson's premise that change is both inevitable and desirable, they are convinced that our survival demands the scholarly development of "anticipatory" information, or the systematic study of possible images of the future. Futurism is in no sense a subset of science fiction. On the contrary, it is as demanding and rigorous as historiography; it merely projects itself in a different direction in time.

For most of us, the future seems unreal because we cannot remember it. Yet our knowledge of the past, called history, is also unreal because histories are so dependent upon the selective perceptions, assumptions, and theories of historians. In short, all history is relative. Futurism is as possible as history because we can organize our thinking in the same way for both. We know something about causation in the social, political, and economic arenas, as well as in the hard sciences. We also know something about change, because we deal with it and endure it all of the time. Therefore, we really do know some things about the future which we think we do not know, and we participate in its formulation every day.

Futurism is interdisciplinary. The notion of a computer terminal in every household by 1985 depends not only on technological projections, but on social, political, and economic estimates as well. The logical sequences and relationships implied in futurism defy compartmentalization; they require academic coalitions if such "predictography" is to function.

Futurism, then, is a way of rigorously examining what may happen, what *alternative futures* are available, given the extrapolations of the various presents, or highly likely near futures. (The effect of values on such projections seems obvious.) Particular projections, called "scenarios," are straight-line sequencing; they are evolutionary and relatively free of surprises. It is the unknown disasters or profound surprises, called "system breaks," which cause the futurist the most difficulty. Within these parameters, the futurist formulates his "possidictions" to persuade us that the future need not be terrifying and to alert us to the need for decision making which will avert disaster.

Educators are compelled to study the future. First-graders in 1974 will enter the labor market in the last decade of the 20th century and live well into the 21st. Assigned the task of preparing students for their adulthood, educators cannot turn away from the challenges of futurism.

The essays here are not intended to be an inclusive treatment of futurism. Rather, they open some particular avenues for exploration, raise some of the pertinent issues, and begin to direct the reader's attention to new considerations. Readers can pursue the matter further by consulting the literature of the World Future Society as well as the following books:

1. Bell, Wendell, and James A. Mau, eds. The Sociology of the Future. New York: Russell Sage Foundation, 1971.
2. Hack, Walter G., and others. Educational Futurism 1985: Challenges for Schools and Their Administrators. Berkeley, Calif.: McCutchan Publishing Corp., 1971.
3. Gabor, Dennis. Innovations: Scientific, Technological and Social. New York: Oxford University Press, 1970.
4. McHale, John. The Future of the Future. New York: Ballantine Books, 1971.
5. Bennis, Warren G., and Philip E. Slater. The Temporary Society. New York: Harper and Row, 1968.

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ABSTRACT

This collection of essays on futurism is intended to open avenues for exploration, raise pertinent issues, and direct attention to new considerations. In "The Future: Implications for the Preparation of Education Personnel," Dean C. Corrigan focuses on conditions that seem pertinent to development in future education and comments about two areas of change: the explosion of human interaction and the explosion of knowledge, accompanied by dramatic technological developments. In "Education Needed To Meet the Psychological Requirements for Living in the Future," Glen Heathers examines major features of changing society that are shaping the future, identifies the psychological demands these changes place on the individual, and lists types of changes in education needed to meet these demands. In "Whither Goest the Curriculum?" Louis J. Rubin makes recommendations for the curricula of the future after reviewing the ongoing disputes among theorists regarding the current difficulties of education. In "A Curriculum for Personalized Education," Robert G. Scanlon defines personalized education as a blend of the critical elements of individualized education, humanized education, and career education. In "Computer Technology: Key to the Future?" Harold E. Mitzel, stimulated by the slow-paced adaptation of computers to education tasks, discusses some of the incentives and constraints that operate on computer application to instruction. (PD)

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TOPIC: *"Forecasting the Educational Future."*

DESCRIPTORS TO USE IN CONTINUING SEARCH OF RIE AND CIJE:

*Educational Change	*Futures (of Society)
*Curriculum Development	*Teacher Education
*Computer Oriented Programs	

*Asterisk(s) indicate major descriptors.

THE FUTURE: IMPLICATIONS FOR THE PREPARATION OF EDUCATIONAL PERSONNEL

by

Dean C. Corrigan

Like the fabled bird who flies backward so that he can see where he has been, we have charted our future from a rear-view perspective enhanced only by hurried side glances at the present. Seldom have we flown positively toward the goals we are seeking via the route we should travel. A systematic look at the future is indeed a crucial activity for all of us. We have no rational choice but to try to imagine what the trends of the next two decades might be so that we can deal with them.

This paper focuses on a limited number of conditions that seem especially pertinent to developments in education in the years ahead. Comments about the future are clustered around two areas of change: *the explosion of knowledge*, accompanied by dramatic technological developments, and *the explosion of human interaction.*

THE KNOWLEDGE EXPLOSION AND TECHNOLOGICAL DEVELOPMENT

Rapid advances on our knowledge frontiers and in new technologies have given us almost unbelievable new processes and products with the power to enlarge or inhibit the potential of the individual and society. The Educational Policies Center at Syracuse University provides examples of the rate at which new knowledge is being created.

1. Half of what a person learns is no longer valid when he reaches middle age.

2. One-third of the items on the supermarket shelves did not exist 10 years ago.

3. Fifty percent of the labor force earns its living in industries which did not exist when the country began.

4. Three-fourths of all the people employed by industry 12 years from now will be producing goods that have not yet been conceived.

5. More mathematics has been created since 1900 than during the entire period of recorded history.

6. Half of what a graduate engineer studies today will be obsolete in ten years; half of what he will need to know is not yet known by anyone.[1]

John Diebold,[2] who coined the term "cybernation," tells us that by century 21 currency probably will be used only for incidentals. Instead of taking home a paycheck, we may have a central account to which our employer's computer automatically credits our salary. All of our purchases at stores, markets, theaters, restaurants, and so on will be automatically debited to our account at the instant of purchase.

New systems for handling of information will soon affect everyone. The library will become a central store of information available anywhere in the country by means of data-communications systems. When we

need particular information, we will simply dial a code number, and information retrieval machines will project the material on a screen or produce electronically prepared copies.

Many other technological innovations are now taken for granted and are only awaiting financing and public acceptance. On the electronic highways of the future, we may dial a destination and let our computer-controlled car pick the optimum route and do the driving. Teaching machines will pace a student's progress, diagnose his weaknesses, and make certain that he understands a fundamental concept before allowing him to advance to the next lesson. Computers will enable a businessman to simulate and test the alternatives of a decision before he actually enters into a deal. And the State Department will be able to feed the factors of a ticklish international situation into a computer and learn the probable consequences of each of a wide range of decisions.[3]

There are, of course, inherent dangers in this approach. What is most worrisome is that when judgments are based solely on the ability to simulate reality and analyze it statistically, the human being--the point of the curve--can become an annoyance. We will have to stay alert to make sure that machines and men stay in balance.

Margaret Mead, at a meeting in Washington, captured the educational implications of the new technology: "To the multiple functions of an educational system we must add a quite new function: education for rapid and self-conscious adaptation to a changing world." She further sharpened the problem when she stated, "No one will live all his life in the world into which he was born, and no one will die in the world in which he worked in his maturity."[4] Very much the same point of view was expressed by Peter Drucker some time ago: "Since we live in an age of innovation, a practical education must prepare a man for work that does not yet exist and cannot be clearly defined."[5] The exactitude of his prediction is already visible.

Obviously, the larger educational task implied by such writers is only partially that of the schools and colleges. Formal education is no longer the exclusive province of the American educational system. Programs, facilities, instructional procedures, outcomes, and budgets for educational activities are now just as much the concern of business and industry. Those of us responsible for our educational system must accept the fact that our elementary and secondary schools and our colleges will be part of a complex of continuing education for a large majority of people. *The learning force will soon exceed the work force.*

The notion of continuing education to keep up with rapid changes in all aspects of life forces an extraordinarily important realization: that no one will ever "complete" an education. The concept of continuing education has been around for a long time, but in former years this meant that an individual had responsibility to continue his personal development on his own. In the future he must find a formal educational structure available to him. Education must prepare him to take advantage of new opportunities, as well as help him to face the insecurities of the changing society promised as his way of life.

Sixty million jobs will change in character in the next generation. Six-year-olds now starting school can expect their vocations to change three times during their lifetimes. Skills will obsolesce and facts will wear out at a more rapid rate. What will be most worth learning will be mainly the knack of learning itself.

There is another side to the matter: As we concentrate efforts on preparing people for productive places in our changing economy, we must recognize that man as a worker is becoming obsolete. However the work of society may in the future be distributed, it is certain that most of the potential productive capacity of our population will not be needed to keep the economy functioning at a very high level. Under such conditions, a man's identity and importance will derive not only from the kind of work he does but also from the kind of life he leads. Education will thus have to include in its objectives preparation not only for a life of work but also for the primary work of life. Buckminster Fuller has put it very aptly in his phrase "learning a living."

THE EXPLOSION OF HUMAN INTERACTION

The sheer growth and location of the population--the demographic characteristics of this country in the two decades ahead--will profoundly affect all of us. The very concept of the city will alter as physical mobility becomes ever greater and communications ever more accessible. Faster means of transportation and communication have already intermingled the ruralite with the urbanite, the northerner with the southerner, the free with the less free, the economically privileged with the underprivileged, the black with the white. The current situation was aptly described in a speech at the United Nations by Ambassador Adlai Stevenson shortly before his death when he said, "The world is now a crowded house." Everything we do is observed; everything we say is overheard. The walls are thin and the connecting doors open. Opposed value systems and mores rub abrasively against one another, no longer separated by the traditional barriers of distance and time. The VISTA motto is certainly an appropriate description of the times, "If you're not part of the solution, you're part of the problem."

Young people and adults need help now and in the future in the development and clarification of values--beliefs that are chosen after deliberation, prized, called upon repeatedly in everyday living, and openly affirmed when challenged. The need for direct attention to values clarification and development will increase as our crowded house becomes more crowded and our interactions even more complex. In addition to teaching how to use the new technology most effectively, education will have to develop effective means for teaching the increasingly important human characteristics of brotherhood and empathy.

A NEW VIEW OF SCHOOLS

We all know that the American school is in crisis today. The primary reason--and it cannot be said too often--is that its role has changed greatly. The school has not necessarily become worse.

Rather, the school has suddenly assumed such importance for the individual, the community, the economy, and the society that we cannot put up with an incompetent educational system.

Peter Drucker succinctly summarizes the major thrusts of the school of the future. He points out that seven goals, destination points, and fundamentals of American education tomorrow can already be discerned.

1. Tomorrow's school will be based on the principle of "no rejects." It will be based on the firm assumption that the school can guarantee that every child will reach a minimum--and a high minimum--of accomplishment in the fundamental skills.

2. Learning tomorrow, from preschool on to the most advanced adult continuing education, will utilize and put to work the individual's own rhythm, his own learning speed, his own pattern.

3. American education tomorrow will, at the same time, be achievement-oriented. It will, in effect, demand of itself that it enable each student to acquire excellence in the area for which his own talents and abilities fit him the best.

4. In its methods the school of tomorrow will be neither "behavioristic" nor "cognitive," neither "child-centered" nor "discipline-centered." It will be eclectic.

5. To move to an entirely different area: tomorrow's school, whether kindergarten, university, or continuing education, has to be integrated into the community and to be an integrator of the community.

6. One way or another, American education today will be held accountable for performance. I do not know how one measures "performance" in education. The reason I do not know this is that one first has to know what the objectives and goals are before one knows what one should measure.

7. And finally, the most important change perhaps, American education tomorrow will no longer assume that one stops learning when one starts working. It will no longer assume that one learns when one is too young to do anything else, and especially too young to work. It will no longer assume that learning stops when living begins.[6]

IMPLICATIONS FOR EDUCATIONAL PERSONNEL

The knowledge and technology explosions, human-interaction explosion, and a new view of schools imply dramatic changes not only in the education and reeducation of today's teachers but also in the development of new kinds of educational personnel not found in current staffing patterns. If the schools are reformed to make learning more

individualized and personalized, a variety of new personnel with diverse talents will be required. "Teaching teams" will be made up of specially trained professionals who will work not only with children and youth but also with other teachers as well.

Teams of Specialists

To the usual specialization areas of subject matter and age level will be added a variety of specializations which will focus on the teacher less as a content specialist and more as a specialist in the nature of learning and the use of learning resources. Teaching staffs in the schools tomorrow will include research associates, learning diagnosticians, visual literacy specialists, computer-assisted instruction specialists, systems analysis and evaluation experts, specialists in simulation and gaming techniques, information systems and data-base designers, and a variety of community education specialists and learning process facilitators.

Associates in teacher education* will be given dual appointments in neighboring colleges. In fact, a new view of the college of education will emerge. It will no longer be just a place on campus: part of the college will be in the community, in schools, or in community, industrial, and social agencies in which many different types of adjunct faculty will participate in research and the training of teachers-to-be. There are already a number of practicing adjunct faculty members in our schools and colleges, for example, clinical professors and clinical associates.

We will also see in the schools new kinds of curriculum specialists who will not be supervisors coming down from the central office to evaluate teachers after a short visit one or two days a year. Curriculum associates will work within the teaching team as consultants and demonstration teachers for the various team members. Especially needed are associates who can assist classroom teachers in new specialized areas such as environmental studies, ethnic studies, and global education.

There will be personnel who can help interpret for teachers what research means in terms of learning and instruction. Research agencies will change too, especially in reporting research in practical terms. The new National Institute of Education has already expressed a concern for developmental research and more effective utilization of research results at the grass-roots level.

In the future, some team members will be specialists in diagnosing the learning needs of each child. Others will create individual profiles on all students such as those developed in the Individually Prescribed Instruction project by the Learning Research and Development Center at the University of Pittsburgh and Research for Better

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*The term "associate in teacher education" is used to identify the wide range of education specialists of the future.

Schools. Such a profile not only reflects what each student knows and is capable of doing next but also is coded in terms of the student's "style" of learning. Teachers feed the diagnostic information about students into an information system that provides them with alternative lessons appropriate for each learner. Curriculum builders in the IPI project have identified 4,200 alternative lessons for math.

Specialists will help discover learning needs and problems in the area of visual literacy. A number of schools today employ such teaching specialists who can identify the visual perception problems of students with diagnostic instruments developed by Marion Frostig. They have discovered that many children who have reading difficulties are children who have visual perception problems. There is need for another type of visual literacy specialist in visual learning resources--the new media--who can help teachers and students communicate more meaningfully through nonverbal means.

Computer-assisted instruction specialists are especially needed right now--programmers who can write exciting computer courses.

Personnel skilled in systems analysis will be needed--specialists who can help tie together all aspects of the total instructional system; who can interrelate the content, organization, and methods, materials, and evaluation aspects of the educative process in ways that produce the most effective learning for each child.

The potential of simulation and gaming will call for new personnel. Through simulation, educational personnel will be challenged by alternatives and consequences they will face in real situations. Since the confrontation situations are drawn from reality, simulation seems to offer another excellent medium to add vitality and relevance to education at all levels.

In increasing numbers of school districts, a professional negotiator elected by the teachers' group deals directly with the board of education. Bargaining agents for teachers in the future will need new knowledge and skills to represent their profession on issues far more complex than shorter hours and more pay.

The day will also come when community education personnel will be in schools. This situation is already developing in many cities. Parents will serve in classrooms assisting teachers with setting up home visits; personnel will identify new families moving into the neighborhood; others will orient new parents to the school and other social agencies; some will serve as troubleshooters to assist potential dropouts; and still others will relate to the ghettos and identify community needs.

A look into the future indicates that teachers and other educational personnel will perform a broad range of human services operating from community-school centers. They may be street workers; they may teach in settings that involve children and parents; they will relate to social services personnel in corrections, mental health, and rehabilitation agencies; they will be part of a team whose goal is to create

healthy human communities. Indeed, the range of personnel educated by the reformed programs will probably be as broad as the needs of the communities served.

Differentiated Staffing

Inclusion of these new types of teaching specialists will bring about differentiated staffing patterns in the schools. This kind of staffing plan does not necessarily suggest only a hierarchical system. The ultimate staffing plan could have both vertical and horizontal arrangements for differentiation relating to function, compensation, and decision making. The key point made here is that new kinds of schools will create the need for a wide variety of personnel to perform specific functions that will meet the learning needs of each student.[7] Some of these new specialities are highlighted in Table 1.

To implement fully the concept of differentiated staffing, teaching tasks must be appropriately analyzed and their components assigned to personnel uniquely equipped by training, experience, and motivation. It will be necessary to assess the degree to which tasks are being carried out and the extent to which the system's educational objectives are being met. Thus, the complexities of the instructional tasks performed must be systematically differentiated and made more manageable to assure an individual's competence in a specified teaching role. The success of differentiated staffing will depend, in large measure, on the profession's ability to delineate intended learning objectives and the required personnel and performance levels necessary to achieve them.

The emphasis will have to be on teamwork as well as specialization if the concept is to work. The last thing that is needed is the creation of more "tribes" within the profession. It should be kept in mind that differentiated approaches in training will have to be planned to prepare personnel for teaching specialties and teamwork within and among each of the groups in any differentiated staffing plan. (See Figure 1.)

As teachers and the general public realize that teaching roles are not all the same, and that each functional role requires different professional knowledge and skills, a clearer image of the teacher as a professional will emerge. Teachers will receive professional pay and status based on knowledge of their specialty and competence demonstrated in performing clearly defined roles as members of a teaching team that is designed to work with learners as unique human beings.

A NEW VIEW OF TEACHER EDUCATION

Such a reconception of education and the kind of educational personnel needed to make it successful will require dramatic changes in teacher education institutions. If beginning teachers, career teachers, and a variety of auxiliary personnel are to learn specialized roles, they will need the flexibility to move through different experiences that cannot be pressed from one mold.

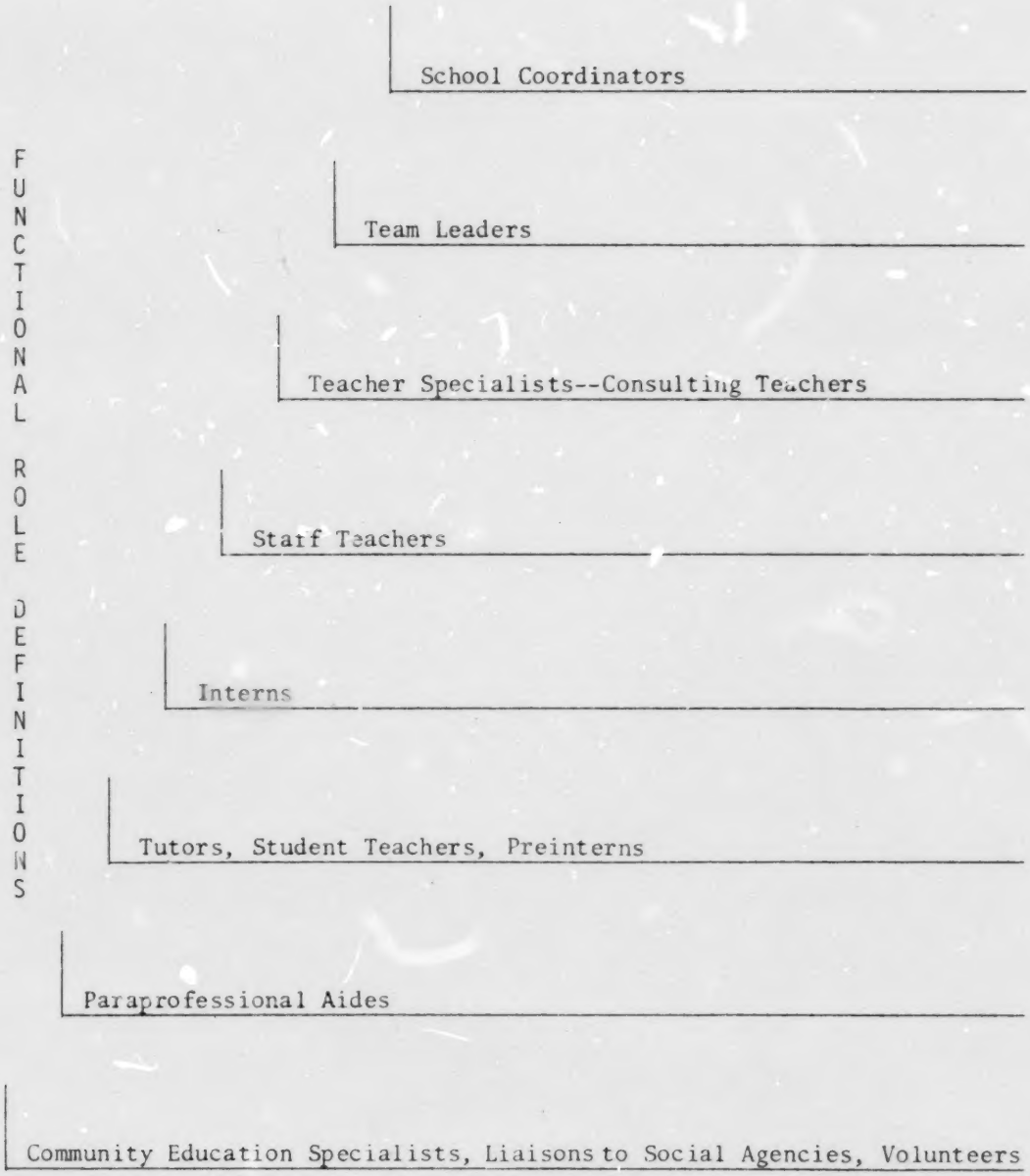
Table 1

EXAMPLES OF TEACHING SPECIALTIES
IN FUTURE TEACHING TEAM PLANS

- Research Associate
- Associate in Teacher Education
- Curriculum Associate
- Diagnostician--Learning and Teaching
- Visual Literacy Specialist
- Computer-Assisted Instruction Specialist
- Systems Analyst and Evaluator
- Simulation and Gaming Specialist
- Professional Negotiator
- Liaison--Community and Social Agencies

Figure 1

EXAMPLE OF
DIFFERENTIATED STAFFING PLAN



In planning programs to meet tomorrow's challenges, we must not operate under the illusion that we can create a single curriculum best suited to all students. The colleges of the future must become demonstration centers of the value of the personalization of instruction and learning. Teacher education institutions will be required to develop flexible instructional organizations that allow personnel to move in and out of systematically designed teaching specialist programs.

We must be careful that we do not become so enamoured with organizational and technological changes such as team teaching, modularized scheduling, and protocol and simulation materials that we fail to develop future teacher education programs in relationship to the great problems of a later time. We must see that the means do not become the ends.

As Olson[8] points out, if education is a personal process which implies an acquisition of self-knowledge and of what is generally called abstract learning, it is also a social and political process. Hence, we need to ask a) whether the education offered to educational personnel in school and college is an appropriate education (as a means of preparing them for the community which they are entering and b) whether the community which they are entering and for which education is preparing them is a humane community. If it is not, the teachers should have some capacity and desire to change things. It is education's job both to foster learning and to develop people who can foster individual development in the child and young person. The goal of finding and encouraging teachers who can foster social growth toward healthy communities is vitally important. The teacher-to-be will have to be educated to be tough-minded on occasion and capable of dealing with the politics of school change and with the unexpected.

A SPECIAL PURPOSE FOR DIRECT EXPERIENCE

In the past, we have justified student teaching and other direct experiences on the grounds that they helped students to a) decide whether or not to pursue teaching as a career, b) develop an awareness of what a person needed to learn to become a teacher, c) learn how to integrate educational theory with practice, and d) demonstrate teaching competencies in a variety of teaching settings. Direct experience in the future should take on a larger mission: to help prospective teachers learn what they have to contribute to the lives of other human beings.

One student who dropped out of school recently stated the problem to me in this way: "My university education has prepared me for the best of all nonexistent worlds. I've got to leave the womb and see if I can do something."

Gaarder of the U.S. Office of Education gets at the crux of the problem when he states that dissatisfaction with our education system--notably, with the psychological and sociological mismatch between student and school--stems in large measure from one simple factor: our

society offers but one legitimate, sanctioned occupation for its youth--attendance at school.[9] This means that our youth, at the time in their lives when they feel most keenly the need to grow up, to create, to question, and above all to participate in the significant affairs of adults, are denied any chance to participate. The only way to begin living earlier is to rebel, drop out, or fail, with all of the personal implications that society attaches to failure. As Weed of the University of Vermont's College of Medicine states in a recent proposal which would reform medical education, "The present situation has come about through what Tolstoy called the 'snare of preparation' which he insists we spread before the feet of young people, hopelessly entangling them in a curious inactivity in the very period of life when they are longing to construct the world and to conform it to their own ideals."[10]

We need to reconnect the university to the real world by permitting students to participate in the adult work-a-day society as they learn. Students who hope to teach should have contact with school classrooms from the day they enter college. Prelaw students should have the opportunity to intern with attorneys and judges; government and sociology majors, with government agencies; and science majors, at research facilities. Students ought to be able to inquire into the conduct of human affairs in a community as they work, adding society's "can-do" skills to the professional ideal.

Moreover, direct experiences for future teachers need not be confined to school settings. Future teachers can learn a great deal by studying human interactions in the world of department stores, city halls, brokerage offices, scientific laboratories, advertising agencies, unions, newspaper rooms, and a wide variety of community educational and social agencies serving society's neglected children, youth, and senior citizens. Such experiences could add vitality to the total university curriculum and provide a redefinition of learning the "liberal arts."

The value of such experiences would not be merely to the students, in hastening their maturity and professionalism; not merely to the university, which would benefit by the increased reality of students' life styles; but also to the community, which would be demonstrating the workshop of life to the young, challenging them to reform it and improve it through participation rather then by idle sophistry.

Presently in our universities, we are in danger of creating enclaves made up of students who have learned to play the game of disinterestedness. This alienation of the mind comes from a lack of something to believe in. Youths who have been kept away from the work-a-day world have never had any way to feel they can do something to help their generation survive. In teacher education programs of the future, direct experience should serve the purpose of helping young people develop a proud sense of belonging to a community.

A NEW STRATEGY FOR REFORMING SCHOOLS AND COLLEGES

Previously, the strategy for improving the schools through teacher education was to prepare new teachers with the most recent knowledge in their field and send them out as crusaders to improve the schools. This strategy failed--the new teachers and their ideas were swallowed up by the system. The teachers now in the schools who are 40-45 years old and have 20 to 25 years of teaching left are "career" teachers. Unless we reeducate them right along with the new teachers, the schools will not improve significantly.

To be valid, changes in the learning environment must follow, not precede, inner changes on the part of teachers. Not only initial training of teachers but follow-up support is indispensable to educational change. It is not enough just to blame teachers and hold them accountable. Teachers, like everyone else, must have the opportunity to acquire new skills and understandings before they can be expected to improve. The major educational challenge facing this country in the next five years is to reeducate 1 1/2 million experienced teachers. It cannot be done between 8 and 8:30 in the morning or between 4 and 5 in the afternoon.

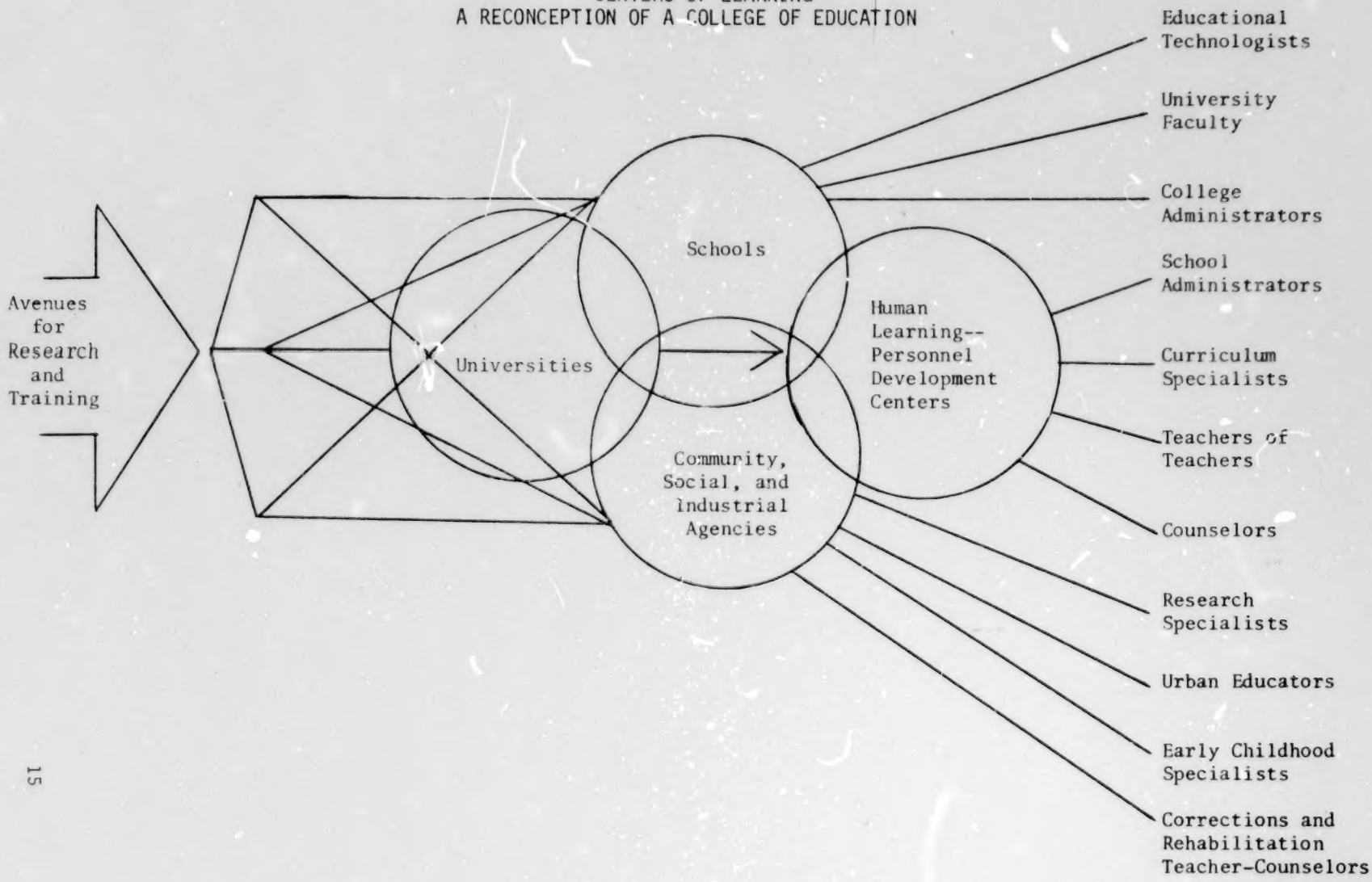
We must develop new approaches to teacher education. Required is a strategy which brings together preservice and in-service teachers in a team relationship in the same training program. The program should have as its primary goal the improvement of all aspects of the education of children and youth. Training should be developed as a by-product of a joint search for better ways to improve the learning environment. From this cooperative school-college commitment to the larger end in view--serving children and youth--the training program will receive its relevance and its vitality.

A new concept of educational personnel development is essential for the 1970s. It is one that sees training as taking place partly on campus and partly in selected affiliated school districts or community agencies. These cooperating units will serve as personnel development or teaching centers. They may be located near the campus or in another state or country depending upon the research training purposes sought. The centers will serve the same function that hospitals serve for medical schools. Research and training will emerge from the problems confronted in improving the delivery of educational services.[11] Distinctions between faculty in schools and faculty in colleges will fade as research and training, and demonstrated competence in these roles, become the responsibility of all members of the education profession. (See Figure 2 for visualization of concept.)

Central to this new design is recognition that preservice education, in-service education, and the schools and colleges themselves are interrelated and interacting components of one educational system. Resources, both financial and personal, must be directed toward strategies that link schools seeking to change with teacher education institutions seeking to break out of established patterns. Shuffling courses is not the answer. A major shake-up is needed in both the form and substance of teacher education, from the student's first introduction to teaching through the teacher's lifelong career.[12]

Figure 2

CENTERS OF LEARNING
A RECONCEPTION OF A COLLEGE OF EDUCATION



Schools and colleges are unnecessarily isolated from one another to the detriment of both institutions. We must replace our present disconnected approach with a new partnership that provides an interlocking system of educational reform and training at all levels of the educational spectrum. If the schools are to provide new alternatives, and if colleges of education are to help initiate and develop them, reform must move in both directions. Teachers for tomorrow's schools must be educated in settings endeavoring to create a new kind of tomorrow.

REDEFINING EDUCATIONAL LEADERSHIP

Educational leadership will also have to be redefined if it is to remain viable. Some of the trends and concepts discussed in this paper will be the determinants of that redefinition. The overriding question that the future will force us to ask ourselves continually is, Are we obsolete?

If we are not to become obsolete, I see the educational leader's role as one which is engaged primarily in planning for the future in the light of rapid change--that planning which has been called the "masterful administration of the unforeseen." The essential new attitude in educational leadership is to feel comfortable with change, to plan for it, to master it, and to embrace it as a way of life.

Let us walk into the future together--forward, not backward. And let us prepare the kind of educational personnel who can challenge our children to create the future, rather than merely inherit it.

NOTES

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EDUCATION NEEDED TO MEET THE PSYCHOLOGICAL REQUIREMENTS FOR LIVING IN THE FUTURE

by

Glen Heathers

A major consequence of current and future societal changes is that they place new or intensified psychological demands on individuals. Such demands require that schools make appropriate changes in their programs and that educational personnel receive special preparation for planning and conducting the needed program changes. This paper examines major features of changing society that are shaping the future, identifies the psychological demands these changes place on the individual, and lists the types of changes in education needed to meet these demands.

UNIVERSAL CHANGE IN SCIENTIFIC-TECHNOLOGICAL SOCIETY

Since at least World War II it has been evident that our society and all other societies throughout the world are undergoing an ever-accelerating tide of change. Change in all aspects of living is so rapid that it threatens to overwhelm the individual. Chase warns: "Changes in the technologies through which man adapts himself to his environment are so rapid as to justify the oft-repeated assertion that, for the first time in history, change has become an ordinary occurrence, and adaptation to a succession of changes has become a necessity for survival."[1]

Interpreters of today's "scientific-technological" society are in general agreement as to its essential features and their probable projections into the future. The slogan terms are all familiar: mass production, mass communication, automation, efficiency, bureaucracy, impersonality, complexity, rapid change, and unpredictability.

Richards identifies the computer as the greatest force for change operating today. "All the foregoing epochal steps may be regarded as extensions of familiar specific capabilities; steam replaced and transcended men's and horses' muscular energy as photography and telephony surpassed and extended the range of our distance receptors. So, more widely, did radio and television. But the offerings of the computer go beyond all such services; they extend the resources of the central nervous system itself. The computer can supply an inexhaustible slave service for whatever we have the wits to instruct it to do. Suddenly, we have a Caliban-Ariel executive that will achieve for us all that we, in our wisdom or folly, can contrive to tell it how to handle."[2]

FEATURES OF SOCIETAL CHANGE REQUIRING THAT PEOPLE CHANGE

Economic Effects of Automation

The widespread and rapid changes in knowledge, technologies, and social forms that characterize society today have vital implications for the individual as worker, citizen, and person. With respect to vocational requirements, increasing automation and the "radical shift . . . from a predominately goods-producing economy to the first predominately service-rendering economy"[3] tend to eliminate routine jobs and to retain or create jobs requiring communication skills, planning ability, and problem-solving competencies. Furthermore, technological

advances occasion frequent changes in job requirements, placing demands on the worker to keep his knowledge up-to-date or to undertake training for a new type of job. Increasingly, "the premium, is . . . not on skills per se, but on the capacity to acquire skills, to modify them, and perhaps to begin again. Adaptability and flexibility are the qualities demanded of today's worker."[4]

A counterpart of automation is its rather precise regulation of the individual through preplanning in detail what he does on the job and what human relationships are permissible there.[5] Broudy, however, offers a safety value to the predicament of worker morale: "The very system that has reduced the individual's freedom occupationally may help to free him from it psychologically. With automation and new forms of power, earning may well become a peripheral rather than a central principle of life and one's key significance may not be sought there."[6]

Another central aspect of change in Western societies has been the mechanization of agriculture, lumbering, mining, and other land-based industries and the migration of millions into the inner cities, where many who lack the education to obtain employment must live in a "culture of poverty." Jennings doubts that the great problems of our urban centers can be relieved except by bringing all our resources to bear on them. "The forces that are roiling in our cities cannot be harnessed by education alone. . . . It is possible that the new critical mass will blow down all the school walls and let the whole of urban society into the classroom. Perhaps the cities themselves must be re-created as giant learning centers."[7]

Political Pressures

The effects of the scientific-technological revolution are as pervasive and powerful in the political and social aspects of society as in the economic. These areas, too, are characterized by mass organization, intense pressures toward conformity to group norms, rapid change, and great uncertainty. Under these circumstances, individuality tends to be stifled and choices reduced to a few group-sanctioned alternatives. Yet, if people are to retain--or regain--control of society, they must exercise social influence and political power. "The alternatives to tyranny by experts or mindless nose counting in such a society is political education for the masses."[8]

The role of instant mass communication, particularly television, in influencing political decisions is of special importance. Increasingly, the politician needs a charismatic TV image to win elections. Citizens, confronted with the growing complexity and uncertainty associated with all aspects of our changing society, are in such a state of insecurity and anxiety that they are easy targets for the techniques of mass persuasion. Learning to interpret and gain control of the uses of the communications media is essential if citizens are to maintain, or re-establish, orderly democratic processes.

Social Change

Changes in the political realm are only a part of the cataclysmic changes taking place in all our institutions and social processes. A valuable listing of trends of change in our social institutions, mores, and folkways is given in a 1972 report of the Commission of Educational Planning of Alberta, Canada entitled A Choice of Futures. The list includes "declining influence of marriage and the family, religious institutions and the work-ethic," "continuing relaxation of the norms governing personal behavior," "decreasing emphasis on values pertaining to law and order, patriotism and cultural identity," "mounting tension between major groups in society," and "growing need for government regulation in inter-personal and inter-group relations."[9]

The breakdown of community controls is most evident in the rapid increase in burglary and crimes against persons in all types of communities--inner cities, suburbs, and rural areas; group violence has become commonplace. "Law and order" reactions to continual violence may be turning the country into a police state. The impact on the individual of the myriad changes in our institutions and social norms has been dramatically summarized by Toffler:

> To survive, to avert what we have termed future shock, the individual must become infinitely more adaptable and capable than ever before. He must search out totally new ways to anchor himself, for all the old roots--religion, nation, community, family, or profession--are now shaking under the hurricane impact of the acceleration thrust.[10]

Effects of Change on the Individual

The influences of societal transformation go beyond the changes it imposes on individuals' economic, political, and social roles. It profoundly influences their views of the world and of themselves and leads to various types of effort to find meaning, emotional security, and self-expression. The "youth culture" represents the search of young people for identity, personal integration, values, and self-expression that they do not find by identifying with, and looking ahead to participating in, the adult world of work, community, and family.

Toffler, in an analysis of the "psychological dimension" of future shock, sees a widespread turning away from a faith in rational ways of coping with one's experience.

> The assertion that the world has "gone crazy," the graffiti slogan that "reality is a crutch," the interest in hallucinogenic drugs, the enthusiasm for astrology and the occult, the search for truth in sensation, ecstasy and "peak experience," the swing toward extreme subjectivism, the attacks on science, the snowballing belief that reason has failed man, reflect the everyday experience of masses of ordinary people who find they can no longer cope rationally with change.[11]

Toffler's catalog of retreats from reality applies to people of all ages in all walks of life who are searching frantically for answers when accustomed ways of adapting are no longer functional.

One of the most pervasive changes in modern society has been the tremendous development of the psychological sciences and their techniques for analyzing and modifying individual personality and interpersonal relationships. We are daily bombarded with "psychologizing" in the communications media: nonfiction books, novels, plays, journal articles, newspaper columns, TV programs, courses, lectures, and ordinary conversation offer constant stimulation to examine our psychological makeup and to interpret others' qualities and behavior. As a result, millions have learned to look inward toward the self, examining their needs, capabilities, feelings, values, and adjustment problems. This turning toward inner experience is constructive when it enables individuals to know themselves better, contributes toward their self-improvement, enlarges their experience, and increases their capacities to relate to others. Such a development of personal resources is what Riesman, Glazer, and Denney termed becoming "inner-directed" as opposed to "other-directed."[12] In future, it may become necessary for individuals to find meanings and satisfactions increasingly in private experience and in the company of intimate companions, since world overpopulation and the depletion of natural resources may restrict the space available to an individual and his geographic mobility (if not his physical possessions).

Yet, neither the needs of individuals nor the demands of society can be met by individuals who retreat into self and build walls against others, since human beings are inherently social and interdependent. Maintaining a free, yet manageable human society in the face of the many forces toward social disorganization and anarchy requires that individuals develop higher capabilities for mutual responsibility and cooperation.

Menninger makes the claim that a loss of moral values combined with a social conscience is a key to society's problems. In Whatever Became of Sin? he holds that the loss of a sense of personal and social responsibility (though a sense of guilt remains) is at the root of our major social crises--corruption, violence, and the pervading sense of depression, gloom, and fear.[13] Guilt, or a sense of sin, results from doing what one feels is not right, which usually means what one believes others would disapprove or punish.

With the rapidly declining influence of organized religion and the decline in adherence to conventional standards respecting sexual conduct and obedience to arbitrary authority, the bases for conscience and guilt are being transformed. Menninger's point, obviously, is that social controls depend greatly on governors of individual conduct that consider the effects of one's acts on others. If religion, parental authority, laws, and police are not to be the sources of restraints on conduct, what will replace and, let us hope, improve on them? The social education of individuals--at home, in the community, at school, and in other agencies--needs to be restructured to provide an effective balance of freedom for self-realization and responsibility for others.

It must take into account new norms of conduct allowing for greater diversity of values and behavior than are permitted by traditional ethics. In this country, this means replacing the Puritan ethic.

Social controls based on the fear of punishment, while necessary, should be counted on less than controls that "accentuate the positive," that is, on controls based on empathy and a sense of common purpose with others. Several recent social inventions offer means whereby individuals can learn effective mutual relationships and ways of gaining satisfactions through acts that benefit others. Group psychotherapy, growing out of individual psychotherapy, is one such invention. Closely related is group dynamics with its T-groups, in which people learn to function in groups. Recently, encounter groups have provided an agency for people to resolve various problems--drug addiction, sexual difficulties, or inabilities to form close friendships; communes have had a particular appeal to youths who seek richer experiences in cooperative living; and in the universities, the co-ed dormitory offers students an education in living intimately with members of the opposite sex.

Learning to relate to members of groups different from one's own is an evident need in view of the growing polarization of society into conflicting units. Lundborg, board chairman of the Bank of America, confronted this need in response to an antibank rebellion directed at his company offices. He invited leaders of the opposition group to lunch to learn their views and to work out ways of achieving solutions to the conflict. His book, Future without Shock, proposes methods of negotiation between opposed groups as a way of resolving issues.[14] Schools could introduce similar means for students to learn to participate constructively in intergroup relations. A total-community approach to education could confront the generation gap by offering genuine intergenerational educational programs. Intergenerational courses could bring adult community members representing different backgrounds and roles together with elementary or secondary students for the serious study of local or national problems. The results would be increased mutual understanding across the generations as well as steps toward devising solutions to the problems studied.

PSYCHOLOGICAL REQUIREMENTS FOR LIVING IN THE FUTURE: A SUMMARY

What chief demands on the individual does societal change impose? These demands challenge education to make changes that will meet them, insofar as education can contribute toward satisfying such difficult requirements.

In the *economic* realm, there is an increasing demand for workers possessing competencies in problem solving and in human relations, and for individuals who are capable of relearning their jobs or preparing for different jobs. The industrial worker's tasks increasingly will be those of creating programs for machines and troubleshooting problems that were not anticipated in automated programs. The need for greater skills in human relations results from the increasing proportion of jobs in service occupations--teaching, work in interpersonal and intergroup relations, social welfare occupations, jobs in government,

recreational work, etc. Special provisions are needed to prepare millions in our inner cities to obtain jobs in industry or service occupations.

In the *political* sphere, there is the need for every citizen to become prepared for responsible participation in dealing with many critical societal problems. The alternative is for our citizens to abrogate democracy through permitting control of our society by whatever special-interest groups can seize power--fascists, technocrats, generals, unions, or corporations. Enlightened self-interest in dealing with issues and problems is at the heart of citizenship in a democracy. But effective democracy demands citizens who recognize that their interests can be served best when, through negotiation and compromise, the interests of many different groups are served.

Citizens respond tardily to events, becoming aroused to action only after problems have become acute. Learning to look ahead--to see local, national, and worldwide problems in their early stages and to take preventive political action--is becoming increasingly essential for survival. An educated citizenry should be prepared to influence the direction and pace of change, rather than adjusting defensively to changes that have already taken place.

In view of the great powers of mass persuasion in the hands of the communications media, citizens have a particular need to learn to delay decisions related to their vital concerns until they have obtained and judged the evidence on issues.

In the *social* realm, the increasing need is for individuals to acquire the attitudes, values, and skills required for effective interpersonal and intergroup relations. Our society is splitting into conflicting groups that are both unprepared and disinclined to find common purposes through negotiation. Ways must be found to break through the communication barriers separating young and old, black and white, affluent and poor.

Central to the individual's social life are close relationships with other individuals in family, work, community, and recreational roles. The growing disorganization of society, in the view of most students of human behavior, has resulted from serious shortcomings in our ability to form and maintain emotionally satisfying relationships with others. Distrust, hostility, and rejection toward one's associates are foundation stones for intergroup and international conflict.

Skills in intergroup relations are as vital as interpersonal skills. An effective community requires that various groups work together to meet common needs, including education, jobs, transportation, recreation, personal services, and physical safety. To counter the growing disorganization of communities, community members generally need to become active participants in groups representing different constituencies that are committed to finding humanistic solutions to problems of common concern.

The same skills necessary for interpersonal and intergroup relations are needed in relations with people in other countries. The prevailing myth that America and Americans are best, and all other countries and peoples inferior, is a poor basis for building international understanding, good will, and cooperation. Racial bigotry toward fellow Americans is paralleled by a readiness to treat people in other countries as less than human. Labeling Orientals as "gooks" and "monkeys" because of their small stature, dark skin, and pajamas made My Lai possible, as it made napalm bombing of noncombatants tolerable to many Americans. Education for international living must begin now.

In the *personal* sphere, each individual needs to develop qualities of individuality that can withstand societal pressures toward becoming what Mills has labeled "the cheerful robot."[15] The individual must learn to tolerate or cope with the complexities, contradictions, and uncertainties of mass society. He or she should become able to achieve personal satisfactions and have meaningful human relationships despite the impersonal qualities of an automated society. And, since the personal side of the individual provides the foundation for the social side, people need to acquire empathy, tolerance, and the will to serve others as well as themselves.

The increased leisure most individuals will have as a product of automation offers the opportunity, as Broudy puts it, to choose between "self-cultivation" and "distraction or boredom."[16] Education for productive and enjoyable uses of leisure becomes a critical requirement since few people spontaneously develop their talents for rich and active leisure pursuits.

Achieving an integrated and personally satisfying set of values and interests is especially difficult under conditions of very rapid societal change. Learning to look at oneself objectively and to examine the consequences of various courses of action, then to choose and act upon what promises to yield a sense of personal worth as well as satisfying experiences, are critical requirements for arriving at personality integration emphasizing freedom and expression rather than passive conformity to external pressures.

Building a rich inner life is an important purpose at any time. It may become even more important if the future brings greater regimentation and restriction of outward freedoms, as seems likely. The "psychological revolution" in today's society points the way and offers methods of getting there. The turning of many toward Far Eastern society for models in Yoga and other disciplines is not merely escapist; it offers a way of slowing down, exploring unfamiliar resources, and learning skills of body, mind, and emotional control or expression.

"Communing with nature" cannot be denied us unless we come to live in concrete bunkers below ground. Books and music offer avenues to private experience. Failing these, we still have the resources of direct sense experience, meditation, and imagination. Our Western society has largely blocked these out in a preoccupation with the world outside ourselves. People in "undeveloped" countries have skills and

habits of living in this private world that exceed ours. It is a fine paradox that our industrial society may require us to return to a more primitive communication with nature and our inner being for psychological survival.

A key point in developing the personal sphere is that allowances must be made for a great diversity in individual values, interests, and styles of coping with the world. Not everyone will elect to follow a model suited to paragons of self-knowledge, autonomy, and active participation in private and social worlds. Some will choose to conform to outward influences. Some will stress emotional rather than intellectual outlets. Others will emphasize sense experience. Still others will seek to express themselves primarily in social relationships or in creative activities. To assume that any one style of life will suit everyone is arrogant presumption, entirely contrary to the history of human society.

An aspect of individuality that will need to be provided for in the future as well as today is cultural identity, that is, identification with the traditions, values, and customs of one's ethnic or cultural group. Being a black, a Jew, an Italian, a Quaker, a Bapist, or a Mohammedan is a central part of a person's identity. Society in the future must allow for cultural diversity and permit individuals to associate freely with members of their groups of choice. Totalitarian regimes that have severely restricted freedom of association and expression have found it virtually impossible to destroy a cultural tradition. When external expression is denied, group identifications remain as an important part of inner experience.

PROVISIONS NEEDED IN EDUCATION FOR THE FUTURE

Based on the analysis of psychological requirements for living in the future, the following aims should receive emphasis in educational programs:

1. Teach all students competencies in problem solving in the various curriculum areas. Skills should be taught in identifying and analyzing problems, then devising and testing solutions, in both academic and real-life situations.

2. Offer all students career education that includes sampling various occupations in real or simulated situations. Regular, individual career counseling should be offered as a basis for planning the student's program of studies.

3. Offer all students systematic citizenship education, including the analysis of issues and societal problems in terms of the values involved and the consequences of alternative decisions. Students should participate in political processes through student government, real or simulated elections, and other governmental activities.

4. Teach students competencies in interpersonal relations, group participation, and intergroup relations. This instruction should give particular attention to studying and interacting with individuals and multicultural groups differing in race, national origin, sex, age, and other characteristics.

5. Involve all students in community study and community activities. This school-in-community approach should provide for a regular interaction between the school and both formal and informal community agencies and organizations.

6. Teach all students to understand and appreciate people and cultures elsewhere in the world, with emphasis on industrially less-developed countries in Africa, the Middle East, the Orient, and South America. Using data obtained by cultural anthropologists, teachers should stress how individuals grow from infancy to adulthood in different societies.

7. Offer all students education directed toward self-knowledge, a positive self-concept, an integrated set of values, and qualities of initiative and independence, enabling them to accept challenges and take needed risks.

8. Teach all students to develop leisure-time interests and skills including physical, intellectual, and esthetic expression and give attention to both social activities and private experiences.

9. Individualize or personalize each student's educational program in terms of courses of study, learning goals, learning methods, and rate of advancement. Instruction should stress the full development of the student as a unique individual.

10. The schools should treat each student as a person of worth and dignity, recognizing that, at any age, the student is the client whose interests the school's staff serves. Students should participate in making decisions about the school program as fully as their maturity allows.

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WHITHER GOEST THE CURRICULUM?

by

Louis J. Rubin

The future has always held a strange fascination. We not only examine the present but look backward into the past to sharpen our judgments regarding the future. But despite our keen desire and increasing sophistication in reading social signs, prediction remains a hazardous enterprise. It is particularly hazardous when simple cause and effect relationships are confounded by other complicated phenomena, as is the case in societal evolution. Predicting the future of the schools, consequently, is not only difficult but in some aspects impossible.

DIFFICULTIES OF EDUCATIONAL FORECASTING

The difficulties of prediction span a broad spectrum. To begin with, despite advances in our social forecasting techniques, the probabilities of inaccuracy remain high. Not only are human beings inconsistent but their actions have unanticipated consequences, and any prophesy is hence at the mercy of the vagaries of fate.

On another count, social interconnections become increasingly complex as human aspirations deepen. Years ago, a curriculum decision could be made with reference to its impact upon youth in general. But now a decision's implications must be assessed with respect to taxpayers, minority groups, teacher organizations, and budget controllers. How could we have predicted, a decade or so ago, that women's quest for equality would require organizing interscholastic athletic competition for girls, or that ethnic chauvinism would lead to decentralized governance in the school systems of large cities?

Yet, for all these vicissitudes, the indisputable fact remains that planning is necessary. Although our best estimates of problems on the horizon may go astray, although our shrewdest plans may eventually falter, the failure to anticipate and forearm often results in much larger catastrophes. There are, happily, some blessings which help matters. Educational forecasting--the projection of likely developments--has several virtues which help to offset its evils. First, contingency planning is possible. We need not bet all of our marbles on a given eventuality. Put another way, there is little to prevent us from constructing optional provisions so that changes can be initiated.

Second, it is possible that some of our projections will be right rather than wrong. It now seems clear, for example, that larger amounts of leisure will characterize future lifestyles and that future lifestyles will be as disparate as they are now. While the probabilities of these predictions cannot be guaranteed, the odds for their being correct are good. If we choose to assume that the curriculum of 1980 will need to reckon with both of these conditions and equip ourselves accordingly, the chances favor our being correct rather than incorrect.

Third, we cannot do anything in the way of preventing undesirable long-range developments unless we decipher the meaning of present trends and speculate about inhibiting mechanisms. It is not difficult to reason that however effective our efforts to conserve energy are, it would also be wise to acquire new and more plentiful sources if our enjoyment

of conveniences is to continue. Similarly, since we now know that extended population growth will lead to a variety of difficulties, we can begin to counterbalance the trend with appropriate corrective measures.

Fourth, there are short-run and long-run dimensions of social forecasting, and the former influence the latter. It follows that dealing with the future can have its most pragmatic inception in the problems of the present. We cannot overlook the fact that our educational system does not yet teach all children to read, or that the present configurations of schooling do not yield successful experience for all youngsters, or that the offspring of the rich usually receive a better education than those of the poor. For many reasons, it is less than rational to contend that prediction, or at least thoughtful forecasting, is the business of fools and lunatics.

CONFLICTING THEORIES OF EDUCATION

A brief review of the ongoing disputes among theorists regarding the current difficulties of education is instructive. Intense debates now rage over the desirability of compulsory education, the comparative advantages and disadvantages of free and open schools, the morality of moral education, and the usefulness of conventional pedagogy. Resolution of these disputes will have a profound impact upon educational events.

Consider Graubard's finding that the rationale underlying free schools is that children are inherently curious and--given a stimulating environment and sensitive guidance--will learn of their own accord. Good education, in short, is inhibited by a set curriculum, preplanned lessons, and arbitrary standards. Freedom is all.

> The most important condition for nurturing this natural interest (of children) is freedom supported by adults who enrich the environment and offer help. In contrast, coercion and regimentation only inhibit emotional and intellectual development. It follows that almost all of the major characteristics of public school organization and method are opposed--the large classes, the teacher with absolute power to administer a state-directed curriculum to rigidly defined age groups, the emphasis on discipline and obedience, the constant invidious evaluation and the motivation by competition, the ability tracking, and so forth.[1]

However, Broudy and Palmer seriously question whether an informal, random approach to learning will produce future generations able to cope with their social dilemmas.

> A technically sophisticated society simply does not dare leave the acquisition of systematized knowledge to concomitant learning, the by-products of projects that are themselves wholesome slices of juvenile life. Intelligence without systematized knowledge will do only for the most ordinary, everyday problems. International amity, survival in our atomic age, automation, racial integration, are not common everyday problems to which commonsense knowledge and a sense of decency are adequate.[2]

Pondering the same theme, Bereiter states that whereas child care and training are both desirable, one should not be confused with the other. Training is designed to induce a specified performance ability; child care, on the other hand, is designed to provide a safe and attractive environment. "The need for training," he says, "arises from the incompleteness of normal experience. To try to reshape the ordinary experience of children so that it includes all that is necessary for the natural acquisition of reading and numerical skills is to produce an absurdly artificial environment."[3]

Katz, contrasting the ideology of theorists who champion a humanistic environment with the competing ideology of those interested in schooling that leads to a more stable society, ends up demolishing the arguments of both:

> The purpose of the school people has been more the development of attitudes than of intellect, and this continues to be the case. It is true, and this point must be stressed, of radical reformers as well as of advocates of law and order. The latter want the schools to stop crime and check immorality by teaching obedience to authority, respect for the law, and conformity to conventional standards. The former want the schools to reform society by creating a new sense of community through turning out warm, loving, non-competitive people.[4]

> The human qualities that radical reformers seek in and through the schools are very beautiful ones; if achieved, they would give us a worthier and lovelier society. But it is no more realistic to charge the schools with the creation of such qualities than it is to expect them to fulfill traditional moralistic aims. Whatever values one attaches to the counter-culture, whatever interpretation one gives to social conflict and crime, it is clear that the powers of schools have been vastly overrated. Despite substantial financing and a captive audience, the schools have not been able to attain the goals set for them, with remarkably little change, for the last century and a quarter. They have been unable to do so because these goals have been impossible to fulfill. They require fundamental social reform, not the sort of tinkering that educational change has represented.[5]

> The moral should be clear. Educational reformers should begin to distinguish between what formal schooling can and cannot do. They must separate the teaching of skills from the teaching of attitudes, and concentrate on the former. In actual fact, it is of course impossible to separate the two; attitudes appear in any form of practice. But there is a vast difference between leaving the formation of attitudes untended and making them the object of education . . . the attempt to teach patriotism, conventional morality, or even their opposite in a *compulsory* public institution represents a gross violation of civil rights. . . . My point is that educational theory should define strictly educational tasks and that schools should concentrate on those.[6]

Convinced that much of the existing curriculum is questionable, Katz believes that students should have a variety of options in moving from childhood to adulthood. These options, moreover, cannot be provided by the present system because of its excessive bureaucratization, rigidity, and traditional value orientation. He finds the problem of values particularly acute.

Without yet speculating as to what is right or wrong in the preceding arguments, we can consider three primary issues on which the debate hangs. One: Should the prescribed curriculum go beyond basics? That is, would we do better to incorporate in our curriculum the development of moral values, creative thought, and democratic attitudes, or should we restrict ourselves to a limited number of fundamental intellectual skills? Two: However we resolve the first issue, can effective learning take place in an informal (unstructured) setting, or must we teach children through systematized instructional procedures? It seems clear that learning of some kind probably occurs whenever and wherever a child is involved in a meaningful activity. But the deeper question is, If we wish to cultivate the ability to read, are structured methods better than spontaneous ones? Three: Can good education contribute, in any significant way, to the improvement of the society? Since the affairs of society are directed by the people in power, the question becomes, Are the values of the power elite influenced by their school experiences?

To further enrich the mix, let us listen briefly to a few other voices. Junell has a different perspective:

> Let us not delude ourselves. It is feeling, not reasoning that keeps alive many of our most widely held moral beliefs and provides us with the motivation for following their precepts. . . . any attempt to induce new modes of behavior that does not utilize the emotional component as the primary anchor point in the learner's experience is by and large doomed to failure.[7]
>
> The fact remains that in the realm of attitudes and values we find ourselves in a quicksand world where good or evil so often hinges on mere impulse, right or wrong on simple conviction, and truth or falsehood on the heart's desire. As inadequate for making judgments as these criteria may be, we cannot entirely escape them.[8]

To follow Junell's prescription, deliberately "inculcating our very young children with a few attitudes calculated to ensure a more humane use of reason,"[9] we would need to make a number of value choices. What attitudes, in particular, ensure a humane use of reason? What ideals are consistent with happiness and survival? And, of greatest moment, how do we reconcile Junell's willingness to deliberately inculcate with Graubard's conception of freedom and Katz's concern for students' civil rights?

Yet Bassett, attacking the problem from still another quarter, sees the possibility of inculcation as hopeless:

So then, if we cannot through prescriptive education predetermine the future (either of the individual or of society)--if we cannot by teaching produce a manipulable citizenry--if it is not possible for education to solve on demand society's problems--if people's behavior cannot be modified as lesson-planned--if education cannot guarantee national survival, liberty and justice for all, peace, virtue, and kingdom of God--then we can afford to relax about these palpable misses and turn our sights on what education can do.[10]

What it can do is help the individual make himself into the kind of person he wants to be. To help him we must first induce him to use the educational opportunities we are able to supply, which means (for starters) changing the school from being grim, joyless, and unrewarding to being appetizing, satisfying, and happy-making, a congenial place to live and work in, free of imposed goals and requirements, ready with a wide variety of learning situations to select from and complete freedom of choice in selecting them. We must grant him, with respect to his education, the basic human right of self-determination. We must treat him, not as a future citizen, but as a present human being; not as a means of social betterment, but as an end in himself. Besides embodying the democratic concept of the primacy of the individual person, this philosophy would almost certainly promote the solution of many school problems, which as Emerson counseled, "solve themselves when we leave institutions and address individuals."[11]

It is hardly necessary to observe that Junell and Bassett, both of whom have a hand in the training of teachers, would not only have a rather lively time over a cup of coffee but, in all probability, strive to shape rather different breeds of teachers. Bassett is convinced that education can neither resolve social problems nor modify people's behavior. Like Katz and Bereiter, he believes that education has labored in vain toward impossible dreams. But he parts with them in that, instead of emphasizing fundamentals, he (like Graubard) would have the schools provide an environment of freedom, granting each student almost total self-determination.

Finally, let me cite two more points of view. Ebel says:

Feelings are essentially unteachable. They cannot be passed along from teacher to learner in the way that information is transmitted. Nor can the learner acquire them by pursuing them directly as he might acquire understanding by study. Feelings are almost always the consequence of something--of success or failure, of duty done or duty ignored, or danger encountered or danger escaped.[12]

The remedy is obvious. No upper grade or high school young person ought to be allowed in a class unless he wants to take advantage of the opportunity it offers. Keeping him there under compulsion will do him no good, and will do others in the class harm. Compulsory school attendance laws were never intended to create such a problem for teachers and school officials. Have we the wit to recognize the source of this problem, and the courage to act to correct it?[13]

> Schools ought to be held accountable. One way or another, they surely will be held accountable. If they persist in trying to do too many things, things they were not designed and are not equipped to do well, things that in some cases can not be done at all, they will show up badly when called to account. But there is one very important thing they were designed and are equipped to do well, and that many schools have done well in the past. That is to cultivate cognitive competence, to foster the learning of useful knowledge. If they keep this as their primary aim, and do not allow unwilling learners to sabotage the learning process, they are likely to give an excellent accounting of their effectiveness and worth.[14]

Strongly persuaded that schools have become hopelessly enmeshed in a chaos of priorities, and convinced that emotional growth cannot effectively be nurtured through classroom experience, Ebel nonetheless believes that moral education is essential.

> Schools have much to contribute to moral education if they choose to do so, and if the court and the public will let them. The rules of conduct and discipline adopted and enforced in the school, the models of excellence and humanity provided by the teachers, can be powerful influences in moral education. The study of history can teach pupils a decent respect for the lessons in morality that long experience has gradually taught the human race.[15]

Thus, Ebel argues that "teachers can be powerful influences in moral education,"[16] whereas Katz, diametrically opposed, earlier contended that the attempt to teach conventional morality in a compulsory school was a violation of civil rights.

Consider, finally, Brameld's proposition:

> To come straight to the point, our most voluble advocates of the "free school movement" offer us an astonishing array of glittering half-truths. Because uncertain and confused about the meaning of the very freedom that they glibly assume, these advocates largely avoid any adequate role of prophecy--that is, of transformative personal-and-cultural designs which alone can provide the shape and substance of freedom itself.[17]
>
> Does not education acquire at least major responsibility to help students appraise and implement the prophetic role of full employment and racial egalitarianism? Are not international sovereignty and global community, regulated control of population through UNESCO and other international programs, esthetic and religious communion between East and West, completely democratic management of both natural resources and megatechnology--are not these prospects of freedom at least equally relevant to "classroom" experiences?[18]

Agreeing with Broudy, Palmer, and Ebel, Brameld questions the long-range efficacy of the free school movement. But he also disagrees with

Ebel, Katz, and Bassett when he extolls the virtues of citizenship education: "Education already projects and thereby reinforces whatever habits of personal and cultural life are considered to be acceptable and dominant."[19] Putting the point even more strongly in a later passage, he asks: "What prophecies shall education be obliged to consider if not the expectations and aspirations that everyday people deserve to confront and to achieve within the less than three decades that remain in this century?"[20]

FUNDAMENTAL QUESTIONS REGARDING SCOPE AND TECHNIQUE OF EDUCATION

Having sampled these disparate voices, what can be said in the way of getting things together? In summarizing the ideas of Graubard, Broudy, Palmer, Katz, and Bereiter, three predominant issues came to the fore: Should the prescribed curriculum go beyond basics? Can effective learning take place in an unstructured setting? Can education contribute to improvement of the society? Now, having reviewed the additional propositions of Butts, Junell, Bassett, Ebel, and Brameld, three further issues arise. First, Should we seek to indoctrinate values? Attitudes and beliefs shift with the times. Yet reason would suggest that some values are universal and that schools are the only organized institutions through which adults can transmit to their young the life ideals they most treasure. Second, Should the content of education deal with personal development, social problems, or both? The choice is between striving for the nurture of competent individuals, in the belief that such competence will enable them to deal with whatever social problems occur, and striving to familiarize those on the verge of adulthood with critical problems of society and prospective solutions. Third, to touch upon the most basic issue of all, Should education be compulsory? In short, should schooling serve individual or social interests?

These six issues are the essential points of departure for making curricular decisions for the future. Whether the coming decades bring an increasing polarization of political ideas, a new concept of the work ethic, or a prolonged period of social violence, the obligation to resolve the issues we now face cannot be escaped. In a manner of speaking, the present *is* prologue and today's difficulties are inexorably linked with those of tomorrow.

IMPLICATIONS FOR THE FUTURE

Much has been written of the future itself. Social scientists, deploying a large number of forecasting techniques, have laid upon us a panoply of probable developments. To be sure, we cannot count upon these projections as certainty, but we probably can assume their likelihood. Hence, if we hold the issues of the present in bold relief, we can look forward into the future to identify probable trends and clarify some of the fuzziness surrounding desirable courses of action.

It is possible that we will witness the growth of a new humanism, the evolution of a lifestyle increasingly preoccupied with the inner person, a rekindling of idealism, and a realignment of balance between acquiring material goods and serving the human good. Should these circumstances occur, our traditional notions regarding the work ethic may change and a period of broad social experimentation arrive. These events, in turn, should spawn a greater degree of social confrontation and violence. Hence, the issues surrounding public schools will be thrust, more deeply than at present, into the political arena.

With respect to curriculum, young people will continue to mature earlier. Instruction will need to address the ubiquitous problems of population control and environmental conservation. Despite a continued interest in career education (if only during the short run), learning and self-growth will be viewed increasingly as ends in themselves rather than as means to an end. School people will seek to orchestrate instructional programs so that more content is acquired outside school. As vested interest groups become increasingly cognizant of the true power of education, the clamor for reform will continue. And, curriculum designers will continue their speculations regarding the pivotal question: What knowledge is of most worth to students who will mature in an uncertain and unstable society?

There are, to be sure, more intoxicating projections: simulated foods, personality-controlling drugs, plastic substitutes for human organs. We are well advised, however, to restrict ourselves to what Heilbroner terms "the knowable aspects of the time ahead." The immediate tasks before us are sufficiently compelling that--in conceptualizing the curriculum we need--it would be prudent to restrain ourselves to the sorts of issues outlined earlier and to those evolutions which already are plainly in process. It is not that the radical changes necessary in the long run are not vital; it is that those in the short run will heavily influence what comes later.

RECOMMENDATIONS FOR CURRICULA

When we learn that a technocratic power structure and a machine-dominated society are in the offing, a number of realistic curricular implications do come to mind. Since it is not the machine but people's misuse of the machine that must change, it may be possible for us to restructure our social patterns to accommodate new cultural needs. With this societal end in mind, certain curriculum underpinnings can be identified relating to social awareness, value priorities, and decision-making skills that lend themselves to schooling. Thus, a question we might ask ourselves to ascertain which future trends have a legitimate bearing upon our task is, What social crises could be reduced or eliminated by learning experiences--in and out of the school --that help shape social sophistication and involvement.

It is difficult to set forth specific recommendations for specific curriculum areas. When the objectives for the short run are weighed, it seems apparent that the indispensable elements in a curriculum for the future are universals: what is good for science education is

equally good for English and mathematics, and what must be avoided in the teaching of foreign language should also be eschewed in the teaching of history.

When current social trends are assessed, and probable future ones projected, the curricular implications which emerge are not dramatic. Recommendations are directed toward identifying a sane and rational transition between what *is* and what *should be*.

In the period ahead we will need a curriculum based more upon active and less upon inert knowledge. Subject-matter content that is purely decorative or steeped in tradition must be abandoned in favor of knowledge that helps the young to better understand their world. Not only do we know too little about how learning occurs in schools, we know next to nothing about the way it occurs outside. We cannot achieve optimal integration between schooling and the education acquired in the larger environment until the integrating mechanisms are clearer. The efforts of the past decade to reform instruction, as well as the alternative schools they generated, have opened a number of useful vistas. Until, however, we devise a variety of options through which students can learn, true alternatives to the present system are improbable.

The school of the future must emphasize decision-making skills. The goal is hardly new; indeed, one might say, as Chesterton remarked of Christianity, that it was not tried and found wanting, it simply was not tried. The importance of decision making increases in proportion to the number and degree of decisions to be made. It is precisely because the citizenry of the future will be called upon to make agonizingly difficult choices in priorities, lifestyles, and social aspirations that the instructional program of the schools must treat, in varying contexts, the processes through which people examine problems, gather evidence, project probable consequences, and reach decisions.

The young who are now in school will find it necessary during adulthood to make difficult decisions regarding scarce natural and economic resources, the distribution of power, and their own identities. They can be prepared for these obligations by a curriculum which affords practice with real events. The study of history can make a contribution (by exposing students to the problems and decisions of earlier citizens), as can the study of drama (by familiarizing the student with the works of the theater that provide a penetrating commentary upon the human condition). It is not the title of the subject, nor the collection of accumulated wisdom it embraces, that will make the difference. Rather, the particular ideas and exercises--extracted for the purpose of developing decision-making skills--are crucial.

Decisions depend upon a body of underlying values. As a consequence, value education must also have a large place in the curriculum of the future. If our social scientists are correct, the future will require individuals to take fundamental positions with respect to personal versus group identity, leisure versus material affluence, formal versus informal learning, and other issues. Other kinds of values will be constructed to fit the times. The curriculum we need must

transmit, at least for consideration, the dominant values of the present society and, at the same time, afford practice in the fabrication of new value systems.

To achieve these ends it may be necessary to provide different kinds of schools for different purposes, to extend the interaction between schools and society at large, to explore new possibilities for learning through work, and to penetrate deeply into the noncognitive aspects of human choice.

Forecasting barometers indicate that we are moving toward a period of pluralism in human beliefs and ambitions. In view of this value diversity, decision-making skills take on even greater importance. If ethnic and other group aspirations conflict, if the distribution of desirable goods and services becomes a matter of dispute, internicine political wars are possible. The nonviolent resolution of these disputes and conflicts, therefore, serves to establish a curricular target. Children's learning experiences must encompass the techniques of compromise and negotiation, the ability to empathize with other points of view, and the willingness to grant others the privilege of difference.

Another imperative derives from the profound need to familiarize the young with ongoing social problems. Curriculum designers have explored the potential of simulated learning. The lessons of real life have more to offer. Some schools have been successful using the newspaper as the totality of the curriculum.

These imperatives give rise to the probability that we will need to explore new forms of education, devise new criteria for evaluating educational outcomes, and train new kinds of teachers. Our best designs are at the mercy of the teacher's knowledge and skill. If we choose to follow the prescriptions of various scholarly groups who have studied needed reforms--introducing learning experiences in human interdependence, expanding our treatment of global education, and using commercial television programs to facilitate our instructional objectives--our obligation to update and refurbish teaching techniques will grow correspondingly.

Finally, the future curriculum may well come to embrace an entirely different role. In lieu of serving as the vehicle for dispensing knowledge and skills we deem essential, it may become a kind of integrating clearinghouse that organizes, directs, and orders the knowledge and skills that students obtain throughout their lives. Closely related to the constructs of Coleman, such a curriculum would not only account for the imperatives listed above, but others as well.[21]

The curriculum is in turmoil, and the time is ripe for action. We would do well to remember that the curriculum is not our proprietary possession; law makers, parents, students, and interested citizens have a great stake in its destiny.

NOTES

1. Allen Graubard, "The Free School Movement," Harvard Educational Review 42, no. 3 (August 1972): 352.

2. Harry S. Broudy and John R. Palmer, Exemplars of Teaching Method (Chicago: Rand McNally and Co., 1965), p. 161.

3. Carl Bereiter, "Schools without Education," Harvard Educational Review 42, no. 3 (August 1972): 406.

4. Michael B. Katz, "Trust the Present Moment in Educational Reform," Harvard Educational Review 41, no. 3 (August 1971): 355.

5. Ibid.

6. Ibid., pp. 355-56.

7. Joseph Junell, "The Limits of Social Education," Phi Delta Kappan, September 1972, p. 14.

8. Ibid., p. 15.

9. Ibid.

10. T. Robert Bassett, "It's the Side Effects of Education That Count," Phi Delta Kappan, September 1972, p. 17.

11. Ibid.

12. Robert L. Ebel, "What Are Schools For?" Phi Delta Kappan, September 1972, p. 4.

13. Ibid., p. 7.

14. Ibid.

15. Ibid., p. 4.

16. Ibid.

17. Theodore Brameld, "Education as Self-Fulfilling Prophecy," Phi Delta Kappan, September 1972, p. 10.

18. Ibid., p. 11.

19. Ibid., p. 9.

20. Ibid., p. 11.

21. James Coleman, "The Children Have Outgrown the Schools," Psychology Today, February 1972, p. 72.

A CURRICULUM FOR PERSONALIZED EDUCATION

by

Robert G. Scanlon

45/46

It is extremely difficult, if not impossible, to predict accurately what schools will be like in the future. An optimistic view is that we can design learning environments that encourage openness, flexibility, individuality, and humaneness; that we can use technological advances in the identification, development, and evaluation of human potential; and that we can provide life-long educational opportunities.

Although there is no consensus among forecasters, there are apparent trends which will affect curriculum. Innovative schools of 1973 illustrate at least three alternatives for the future. First, some schools are providing individualized options which put the student in the center of the instructional process, provide diagnostic-prescriptive techniques which promote the learning of cognitive skills, and place greater emphasis on self-initiation and self-directed learning. Second, there are programs aimed at higher-order cognitive, interpersonal, and achievement-competence training skills resulting in a student population prepared for a changing society. A third dimension, career education, is being developed in some schools and/or school districts to provide students with hands-on work experience. The overall result of these new instructional dimensions will be a personalized education.

PERSONALIZED EDUCATION

Personalized education blends the critical elements of individualized education (including the teaching of basic skills) with humanized education and career education.

Individualized education is a much broader concept than individualized instruction. Individualized instruction essentially involves the personalization of the instructional process to meet the individual learning needs and abilities of each student. A variety of educational techniques have been developed to do this, including structured learning systems and individual tutoring. Individualized education, on the other hand, is an elaboration of this concept. It includes modifying classroom management practices and school administrative procedures to address the individual needs and capacities of teachers and administrators as well as students.

To support each individual, alternatives or "social drawing rights"[1] will become a major consideration. Rather than adhering to compulsory, prescribed programs, schools will offer a common core of learning and, at the same time, provide diversity and choice. In short, individualized education implies the personalization of the entire educational process, not only of its instructional aspects.

The development of basic skills is a priority in the intellectual goal (see p. 49). This includes the systematic presentation of reading and mathematics and an interdisciplinary approach to teaching all subjects. Although the dominant theme of curriculum theory today is that disciplines should be taught, education should not be limited to knowledge acquisition. Instead, there are techniques to be learned, skills to be mastered, activities to be explored, and attitudes to be developed. In

developing a curriculum for the basic skills, the application of technology can create more effective instructional methods. Hardware with accompanying software will provide new opportunities for individualization. Basic instruction in facts and fundamental concepts can be carried out with equipment already available. In addition, technology can help in educational coordination, supervision, and management.

Humanizing learning provides for the personal, social, intellectual, cognitive, lifelong, and creative goals. The development of affective and social skills involves how to learn and use learning and how to gain mastery of oneself and the surrounding environment. Included are the skills of interpersonal communication and values clarification as well as the cognitive skills for processing information.

Education will emphasize students' becoming effective thinkers and learners with inquiry and problem-solving skills, social skills, and emotional awareness and self-identity. As Harmon states:

> Education will center on developing self-learning habits and skills, problem-solving and decision-making abilities, individuality, sound valuing capabilities, capability of continuous self-renewal, and self-understanding. Education will be much more equated with life, and with the distinction between formal and informal education having become blurred, will be much more a life-time activity. The significant distinctions will not be work versus education or work versus leisure, but work-education-leisure versus "killing time."[2]

Career education provides career development, guidance, and counseling, as well as activities to meet lifelong, ethical, creative, and career goals. The shift from teaching for information to teaching for experience will result in learners becoming involved in real-life activities. New arrangements will involve educational agencies, the commercial world, libraries, museums, mass media, and various institutions. More emphasis will be placed on career opportunities and vocational preparation. Students will become familiar with the world of work as part of their overall education.

Comprehensive programs will provide students of differing abilities and from a wide range of age levels with new and varied skills. Intensified programs of in-service training and retraining will be available for all citizens, in both schools and other institutions. Extended education will be increasingly emphasized as society's need for trained people in highly complex technical disciplines grows. Lasswell has pointed out, "As education proceeds as a life-time activity, the school will . . . become a life-time civic center."[3] No one will ever complete an education.

The major goals for a personalized curriculum are summarized below:

Personal Goal — The personal goal encourages growth of human potential, the ability of the individual to learn for himself or herself, organize his or her own time

and work, and exercise initiative. Greater emphasis is placed on self-fulfillment, with respect for the dignity of human life and the unique worth of each person.

Social Goal — The social goal encourages the growth of interpersonal skills and provides satisfying relationships with others. Empathy for others plays a major role in the development of vital communication skills.

Ethical Goal — The ethical goal encourages the development of personal values and social conscience. Students should understand the value of a diverse and pluralistic society and demonstrate personal and social acceptance of individuals and groups who have different beliefs, habits, and customs. Respect for democratic political processes is included.

Career Goal — The career goal encourages the development and maintenance of occupational competence. All students should develop work skills and attitudes which lead them to respect and value work. These skills should be developed through field experiences.

Intellectual Goal — The intellectual goal encourages development of intellectual, aesthetic, and creative abilities. All students should have basic skills development supplemented by perceptual physical, aesthetic, and artistic opportunities provided through interdisciplinary activities.

Cognitive Goal — The cognitive goal encourages development of skills for organizing and integrating information and a framework within which to judge diverse values. Effective processes of decision making are emphasized.

Lifelong Goal — The lifelong goal encourages lifelong education leading to the individual's enjoyment of the learning experience and the motivation to pursue education. Students' enthusiasm for learning should be maintained throughout life.

Creative Goal — The creative goal nurtures the growth of broad leisure and recreation interests and skills. To meet this goal, attention must be given to social activities and personal experiences.

Providing Life Skills for the Changing Society of the Future

Individual learning needs and abilities are the basis for building curriculum options for personalized education. Factors considered are

the nature of past performance, talent, interest, and motor and perceptual abilities. As cognitive theories become more specific, the effects of instruction built upon these theories will provide additional data on individual differences. This will become the basis for personalized education and the design of adaptive environments.

As a major component of personalized education, individualized education will provide individualized learning opportunities in school and in other learning settings. The school will have overall responsibility for student activities and specific responsibility for intellectual skills. Through utilization of community resources, learning will occur as a by-product of active participation in problem- and task-oriented activities. Community seminars will explore local issues and provide "intergeneration" education.

Personalized education emphasizes adaptability. Use of structured materials in basic skills and open packages or experience will provide students with the freedom to choose their own learning routes. Furthermore, personalized education must incorporate the development of affective, cognitive, and interpersonal human potential. A large body of information exists about the skills people need to function effectively and happily as human beings in an increasingly interdependent world. These skills are not being taught in schools or in other institutions. In the future, it will be even more important that individuals know how to learn and use these capabilities and skills.

Basic Skills

The basic skills of mathematics and reading-language arts require systematic instruction. The preplanned and formalized learning process will use a diagnostic-prescriptive mode. The objectives of the system are as follows:

1. To permit student mastery of instructional content at individual learning rates,

2. To ensure active student involvement in the learning process,

3. To encourage student involvement in learning through self-directed and self-initiated activities,

4. To encourage student evaluation of progress toward mastery, and

5. To provide instructional materials and techniques based on individual needs and styles.

To provide for these objectives, the following aspects of instruction will be considered:

1. Detailed specification of educational objectives;

2. Organization of methods and materials to attain these objectives, including a variety of paths for mastery of any given objective;

3. A procedure for the diagnosis of student achievement in terms of the educational objectives;

4. Individual daily evaluation and guidance of each pupil, including a system for individually prescribing the learning task that the student is ready to undertake;

5. Provision for frequent monitoring of student performance in order *to inform both the pupil and the teacher of progress toward an* objective; and

6. Continual evaluation and strengthening of curricular and instructional procedures.

Other disciplines will be taught with an interdisciplinary approach via industry, the community, and the open school structure. Memorization of subject matter will be obsolete, since the information data base will change very quickly. Social science will remain in the curriculum, but the objective will be to help each child understand the social, economic, and political system in which he lives. Thus, the focus in an age of cultural pluralism will be the child's own environment, be it Indian, Spanish, or African.

In teaching basic skills, technology can be used to create effective and persuasive educational messages. For example, video cassette recorders and "portapaks" offer the opportunity for creative personal involvement. Communication satellites will provide for an information network over long distances and delivery over wide areas. Computers, on the other hand, will have the most widespread use. Activities include drill and practice, measurement of student performance, individual problem solving, and, most important, the management of instruction and learning opportunities. In particular, the process involving individualized treatment for large numbers of student will require computer assistance.

Thus, the objectives of individualized instruction can be used as a basis for designing educational technology. How these devices will be made more cost-effective by new miniaturizations and transistors remains a question, but plans for their utilization must begin now.

HUMANIZING LEARNING

Unlike academic subjects such as mathematics, the skills which prepare children to live and learn effectively in an interdependent, rapidly changing world have not been widely recognized until recently by curriculum theorists. Environmental factors such as a) complex pressures of group behavior on individuals, b) interpersonal conflict, c) value conflict, and d) increased decision making will influence the future. Thus, the curriculum must provide for the student as a whole person in a total environment rather than an individual learning in a school situation. The emphasis in schools of 1985 will be to free the individual from subject matter as "bodies of knowledge" and to provide him or her with higher-order cognitive, interpersonal, and achievement-competence skills.

The curriculum will recognize individual differences in the affective areas and the importance of individualizing the learning process. For example, self-paced, multimedia programs and materials are now being developed for the higher-order cognitive skills. They emphasize collecting, evaluating, and applying information in real-life problem solving. Processing information, in contrast to just collecting facts, is the key to training in this area.

One type of cognitive skill involves development of the processes for value clarification, value analysis, and personal and ethical decision making. Data to be evaluated come from within the student rather than from the outside world. A second cognitive skill involves making judgments by forming and testing inferences. A third skill is making adaptations and changes. Using these skills requires confronting moral dilemmas. Students develop an awareness that problems are not clear-cut and that choices have to be made.

In addition to cognitive skills, humanizing learning must emphasize effective communication between and among people. These interpersonal skills can be taught by a process which begins with teaching the necessary language for each individual to describe what he or she feels and experiences. The next step is to practice these skills in interacting with others. Through this process, students learn to differentiate between sympathy and empathy, facts and opinions.

Another major area for humanizing learning, achievement-competence training, is aimed at building self-motivation, internal control, self-respect, and self-worth. The heart of this area is a six-step achievement strategy. Step one calls for the students to study themselves. The second step asks them to use the self-study data to formulate personally meaningful goals. Step three teaches them to set specific medium-risk goals--not too easy yet not too difficult to achieve. The fourth step calls for them to plan to guide their efforts to achieve the selected goal. Step five teaches a range of striving methods which they can use to facilitate their work. Finally, step six asks students to evaluate the quality of the accomplishment. Through these six steps, achievement-competence training increases students' ability to gain mastery of themselves and the surrounding world. They learn how to know, accept, and be themselves.

Humanizing learning fosters the development of human beings by providing life skills. This curriculum illustrates a) commitment to the value and worth of each human being and b) awareness of individual potential and the social, intellectual, and emotional components of interaction with the environment.

CAREER EDUCATION

Career education is a recent, large-scale research and development effort which has curricular implications for the schools of the future. Since former U.S. Commissioner of Education Sidney P. Marland assigned a national priority to career education, there has been a widespread movement to define the concept and establish career education programs

in schools. Although the concept remains somewhat ill defined, programs are under development in several locations. Some common principles, however, are guiding the development of all career education programs.

The ultimate goal of career education is to help students prepare for a satisfying life and career. A rewarding work experience is considered essential to each individual's well-being. Consequently, schooling should address the tasks of learning about and preparing for the world of work. As these concepts take hold, an increasing number of schools are reorienting their curricula to focus on preparation for future life and career.

With this focus in mind, the career education movement is rapidly becoming an integrating force for a variety of trends, issues, and innovations. Various career education programs are trying out experience-based education, computer simulations of real-life experiences, life-long education, nontraditional learning environments, affective education, and new forms of basic education. All this experimentation is being conducted in the context of two major operational components of most career education programs--career guidance and career development.

Career Guidance Programs

Career guidance programs have three basic objectives:

1. To increase the accuracy of the individual's perception of self and environment;

2. To provide relevant information for the individual's social, academic, and career development; and

3. To improve the individual's ability to make and execute plans, solve problems, make decisions, and take action.

Career guidance, then, concentrates on the needs of the individual student in direct relation to future life and career. Unfortunately, many students are choosing careers with an inadequate base of information about themselves and a limited view of the range of skills required to prepare a career. To meet these problems, career guidance emphasizes programs for self-understanding, career decision making, and life skills preparation.

Some schools are reorganizing their guidance programs to meet these objectives. Career growth and development is being viewed as a lifelong process which properly includes not only work responsibilities but also leisure activities, community rights and responsibilities, home and family life, and interpersonal relations. Guidance counselors are providing much more information to students about their individual abilities, interests, and applications on the one hand, and the nature of various career opportunities on the other. Affective education programs are being offered under the auspices of some guidance departments

to help students define career objectives, clarify career values, and develop career management skills.

Career Development Programs

The primary purpose of career development programs is to assist students in acquiring the general knowledge and skills which are required to interact effectively with the economic sector. Specific skills include the rights and responsibilities of workers; financial and psychological rewards of various careers; business practices and their impact on the individual as a worker, consumer, and citizen; and general job-related skills such as basic academic skills, job acquisition skills, and job maintenance skills.

Career development in schools often involves a structured sequence of learning experiences termed career awareness, exploration, and specialization. Career awareness programs introduce students in the early grades to the nature of work and the various career opportunities available to them. Exploratory programs provide students in the middle grades with the opportunity to explore a wide range of jobs in various career clusters such as finance, government, and manufacturing. Specialized programs provide in-depth training in particular occupational fields selected by the student.

Career development programs experiment with nontraditional educational environments and innovative instructional techniques. Various models of career development emphasize employer-based, community-based, and home-based learning experiences as well as traditional school-based programs. Individualized learning programs are under development to teach the basic concepts in reading and mathematics which are directly relevant to various occupational fields. Computerized programs are being designed to manage student progress through a career development program and to simulate hands-on learning experiences.

Research and experimentation on career education point to new directions for the shape of at least some of the future curricula. New content and formats are already beginning to appear in materials such as the Yellow Pages of Learning Resources,[4] computer simulations of employer-based learning experiences, structural guides for group counseling techniques, and effective curricula on achievement motivation and interpersonal relations. Nevertheless, the traditional textbook/workbook format will almost certainly constitute the bulk of the curricular materials in the immediate future.

CURRICULUM FOR THE FUTURE

Speculative literature today is replete with contrasting future forecasts. Predictions of a "second-phase industrial society" with a high level of technology and cybernation or of the coming of a more drastic period of violence followed by a police state are questionable. I prefer to believe in a trend toward a person-centered society with emphasis on the development of human potential. As stated in the Report of the Citizens Commission on Basic Education of the State of Pennsylvania:

A curriculum ought to reflect views of what people *should* know and do; what they realistically *can* know and do; and what schools can do to help students see these human possibilities and boundaries.[5]

NOTES

1. Daniel Bell. "A Sociologist's View of the Future." Paper presented at the National Symposium on Alternative Futures for Education and Learning, Philadelphia, 26-28 October 1973.

2. Willis W. Harman. "The Nature of Our Changing Society: Implications for Schools" in Curriculum and the Cultural Revolution, eds. David E. Purpel and Maurice Belanger (Berkeley, Calif.: McCutchan Publishing Corp., 1972), p. 20.

3. Harold D. Lasswell. "The Future of Government and Politics in the United States." Paper presented at the National Symposium on Alternative Futures for Education and Learning, Philadelphia, 26-28 October 1973.

4. Richard S. Wurman, Yellow Pages for Learning Resources (Cambridge, Mass.: M.I.T. Press, 1972).

5. Report of the Citizens Commission on Basic Education (Harrisburg, Pa.: Bureau of Publications, November 1973), p. 18.

COMPUTER TECHNOLOGY: KEY TO THE FUTURE?

by

Harold E. Mitzel

5 1/58

Modern digital computers have been a force in our society for only about a quarter of a century; yet they touch the lives of every one of us, even in the commonplace act of driving to a shopping center. The cars we drive were assembled under the control of a computer program and are tuned by mechanics who use small computers to analyze engine performance. Traffic lights are computer controlled; auto owners' cards, issued by state governments, are produced from computer-based vehicle files; and insurance companies maintain computer files concerning driving histories and vehicles. Lastly, we receive computer-produced demands-for-payment when we buy with credit cards.

If, in the short space of 25 years, we have come to rely on the computer's services to drive to the store, the seemingly much slower pace of computer application in basic education is puzzling. What is the role of computer technology in our educational future? What forces in a postindustrial society are shaping those applications of computers to both formal and informal education? Is the role of the computer in basic education in the year 2000 preordained, or is there something we can do to optimize that role?

The purpose of this paper is to review briefly the major applications of computer technology in schools and to examine the constraints and incentives which will bear on their future role in basic education. I will restrict my remarks to computer applications in public and private lower schools.

MAJOR USES OF COMPUTERS IN SCHOOLS

There is no completely satisfactory way to classify known computer applications in schools because of the wide diversity of practice. There are, however, four major applications: a) computer as an administrative aid; b) computer as scientific, arithmetic problem solver; c) computer as an information retriever; and d) computer as an instruction facilitator.

Administrative Uses

Computers have their largest education application in administrative functions: preparation of payrolls, accounts receivable, accounts payable, and inventories. Teacher organizations favor the administrative use of the computer as a dues checkoff device.

Scientific Computing

The rapid growth of research and development activities in colleges and universities has been made possible by the parallel growth in computer technology. Scientific computing in higher education, as differentiated from instructing students in computing techniques, has been the principal education application of computers during the past two decades.

Problem solving with computers, though less frequently applied in secondary schools than in colleges, is becoming increasingly important. Korotkin et al., in a survey for the National Science Foundation, learned that about 13 percent of U.S. secondary schools had some type of computer either on school grounds or available to staff and selected students through a remote terminal.[1]

Information Retrieval

Not so well advanced in schools is the use of the computer as an instantaneous retrieval device. This application for separating one from many depends upon sophisticated disk storage and time-sharing equipment that is commonplace in universities and large industries, but rare in schools. For the future, computer-based information retrieval looks promising as schools try to improve their services. The Remote Access Management System (RAMS), conceived and operated by the Oakland Intermediate Schools in Michigan, illustrates such an application.

Instruction Facilitation

The fourth major application of computers is in facilitating instruction. Three subdivisions of this use are discussed below: drill-and-practice, computer-managed instruction, and tutorial or computer-assisted instruction. The gap between the computer-based potential and current practice in schools is gigantic. If there are approximately 50 million children in grades K-12 who spend an average of 5 hours per day in schools, then there are 250 million hours of scholastic effort per school day, of which perhaps half is adaptable and appropriate to either complete pupil/computer interaction or some kind of computer supplement to regular lessons. With 125 million hours available per day during a typical school year of 180 days for some kind of computer-based interaction, a staggering total annual opportunity of 22 1/2 billion instruction hours exists in the nation.

This opportunity can be met in a variety of ways. Drill-and-practice applications are perhaps the best known. Typically, the subject matter is mathematics or some other well-ordered material, and each learner gets a 10-15 minute "shot" per day at carefully programmed material. Initial exposure of the pupil to the particular concepts has been accomplished by traditional means. In this sense, drill-and-practice on the computer is supplemental to mainline instruction.

In using a computer-managed instruction (CMI) system the learner acquires information, skills, and concepts in traditional ways. The computer is used in a testing mode to record and synthesize a performance record for each learner. In primitive CMI systems the computer-generated information is used by a teacher to make individual diagnoses and prescriptions for learners. In advanced systems, the learner uses the computer terminal and receives diagnostic and prescriptive information at his or her own pace. There are probably fewer than a dozen CMI systems in active use, involving a few thousand students annually. However, because CMI systems are relatively inexpensive, their development seems assured.

When most educators speak of computer-assisted instruction (CAI), they envision a tutorial application involving both the learner and the stored program in the computer. The Socratic model of one teacher and one learner has generally been followed. A time-sharing feature on many computers makes it possible for each of several learners to feel that he or she has the exclusive attention of the device. The curriculum is offered in such a way that the student is expected to reach the objectives of instruction at the computer terminal without much outside study. Thus, in tutorial CAI the computer can be thought of as being integral to instruction, whereas in CMI and drill-and-practice modes the computer activity is only supplemental.*

Although computer technology has had considerable influence on American life, it has not yet had much impact on major instruction programs in schools. If the computer is to realize its potential in schooling, what are the conditions under which computer technology is the key to the future?

RATIONALE

Many protechnology enthusiasts (Tickton,[2] Carnegie Commission,[3] Committee for Economic Development,[4] and Worth[5]) have assumed that the potential power of computers would be brought to bear on education. They have justified this position by assuming that because the computer has become indispensable to science, research, business, industry, banking, travel, and dating bureaus, it will soon become an indispensable tool of instruction. This position fails to account for the constraints as well as incentives for bringing computer technology to bear on the mainstream of schooling in this country.

Although we have by no means considered all factors, the subsequent discussion is organized around the following topics: a) expectations of schooling, b) demand for diversity, c) humane schools, d) creation of an education market for computers, e) staffing the computer-based curriculum, and f) paying the piper.

Expectations of Schooling

Many citizens are dissatisfied with the current results of schooling.[6] Employers cannot assume that a high school diploma indicates literacy. Ghetto parents know that their children do not like school and are not acquiring basic skills. College professors are appalled by the absence of scholastic skills on the part of new arrivals on campus. But despite these recurring and valid complaints about the results of schooling, our society still honors knowledge and employable skills, and the average citizen is sure that with a little tightening up here and there, particularly on the teachers, the schools can turn

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*I have intentionally omitted the instructional applications in computer science and data processing courses in which the computer is employed as a tool to teach computer programming.

out a satisfactory product. To suggest a massive infusion of new computer technology into a pervasive climate of so-so satisfaction with schools is to court failure and frustration. We as educators and molders of opinion must raise citizen expectations of schools. Our children are capable of learning, achieving, and creating much more than our schools and homes are currently affording. Sizer offers an extensive discussion of this point.[7]

The logic and preprogrammed decision-making capabilities of the modern digital computer make it the only candidate immediately in view that can handle the complex task of monitoring, summarizing, diagnosing, and prescribing instructional moves simultaneously for many learners. Of course, educators do not yet know in any detail which of the hundreds of descriptive variables about learners are most relevant for instruction. But this needed evidence represents an empirical question which can be derived from the experience of programming courses of instruction for computer presentation and trying them out on learners with many hypotheses about different learner-adaptive variables.

We have long recognized the motivating effects of self-direction for independent study. If instruction can be put into computer storage, and learners given a wide variety of choices in deciding what they want to learn and in what sequence, then students' motivation and self-direction will increase. These applications of the computer depend neither on new technological developments nor on new pedagogical concepts. The major restraints lie within the social institutions responsible for education.

Demand for Diversity

Toffler makes a persuasive case for the long-term trend of increasing diversity in lifestyles and consumer products. In his view, the use of computers in schools offers the opportunity to respond to increased citizen demand for diversity.

> Computer-assisted education, programmed instruction, and other such techniques, despite popular misconceptions, radically enhance the possibility of diversity in the classroom. They permit each student to advance at his own purely personal pace. They permit him to follow a custom-cut path toward knowledge, rather than a rigid syllabus as in the traditional industrial era classroom.[8]

This demand for diversity by pupils is not being responded to adequately by most educators in daily contact with children. The conflict thereby created will not be alleviated by adding more policemen to the school staff, nor by reducing average class size from 30 to 28 students. On the other hand, computer programs which encourage inquiry, simulate real world processes, and provide for widely varying pupil interests do create a diverse environment for learning.

The computer makes it possible for educators to expand greatly the available curriculum for learners. The knowledge retrieval capability of large computer systems, plus the storage and use of adaptive information about learners, will make it possible for every learner to have a unique curriculum. No longer will debates about curriculum be

restricted to what can comfortably be taught to an average group of youngsters at a particular grade level. The computer makes it possible for learners to have individual access to a wide variety of information. Instead of long debates about what is worth teaching, future educators will be able to shift this responsibility to the learner.

Most people who remain ignorant of the essential open-endedness of a computer system believe that computers impersonalize and dehumanize people. But, actually, the computer is capable of responding, *when programmed properly*, to an almost infinite variety of patterns of behavior, physical characteristics, and tastes. Children who have not been taught to fear technology quickly grasp the diversity inherent in the computer and often become its devotees.

Toward More Humane Schools

One root cause behind the common observation that schools fail to educate lies in badly deteriorated relationships between teachers and students. The crisis in teacher-student relationships is borne out by school statistics on excessive absences, vandalism, drug abuse, riots, and violent attacks on authority figures. School is perceived by students as a spiritually destructive place which fills no essential need in their lives. Teachers and administrators are viewed as adults who "holler" at kids, enforce petty rules, and wield arbitrary power. An adversary system dominates classroom interaction in which the teacher, backed up by the principal and guidance counselor, is pitted against the students. While destructive interpersonal games are played out in some schools, the rest of society anxiously watches from the sidelines.

One of the first things we must do to reform schools is to increase the expression of human warmth between adults and students. The challenge is how to change the emotional climate of the classroom without sacrificing progress in the achievement of academic goals. Students must be rewarded for their honest attempts to learn. To provide them with praise and other indications of their self-worth, we must obtain more feedback than is characteristic of the classroom which provides a cage for 25-30 children, one teacher, and a variety of inert materials. Medley and Mitzel have shown that most lessons above primary level are conducted as either an expository lecture or a class discussion.[9] Individual pupils have only minimal opportunities to interact directly with the teacher, who must somehow instruct 30 children as if there were only one.

In a previous article I have shown how an aggressive, able youngster in a traditional class discussion can recite and receive feedback, including praise, 4 or 5 times during a 40-minute class period.[10] A shy, withdrawn child is easily overlooked and unnoticed and may recite with expressions of teacher approval only once a week. Contrast that mass-education picture with the computer-assisted instruction workroom where every child receives feedback and encouragement of his or her learning efforts once every 30 seconds, on the average, for a total of 80 different rewarding and informative exchanges in a 40-minute period at the computer terminal.

With sensitive programming, computer terminals can create an absorbing, responsive environment for learning. The student knows that when he or she makes a response, something will happen immediately to provide him or her with an appraisal of the quality of the response and offer guidance toward future efforts. There is little wonder that 450 ninth graders in a Pittsburgh high school who spent a portion of their daily mathematics lesson at the computer terminal and a portion in individualized study with print media markedly preferred the computer experience.[11]

So far we have discussed the superiority of the computer terminal over conventional mass instruction in creating a responsive environment associated with typical learning activities. But there is an additional opportunity for greatly improving the quality of the school climate when computer tutorials are introduced into schools.

To understand this second opportunity we can classify teacher skills as being of higher or lower order. Examples of lower order skills are presentation of information to be learned, display of drill-and-practice exercises, evaluation of student responses, and provision of feedback. Examples of higher order skills are diagnosing a student's learning disability, mediating a dispute, assessing the impact of a student's home environment on behavior, and expressing comfort for a wounded spirit or an injured body. The cause of instructional reform would be greatly advanced if lower order skills were handled by carefully sequenced computer programs. Teachers would spend less time on lower order skills and would transfer their uniquely human talents to the higher order skills for which there is no computer programming in the foreseeable future. Many teachers would have to be retrained in order to shift their emphasis from lower order skills to the higher order ones.*

Silberman documents the great interest being expressed by American educators in the British infant school model.[12] By minimizing structure and emphasizing student freedom to inquire and explore, those schools are unquestionably improving the students' attitudes about going to school. Many Americans will, however, be unable to accept the absence of the traditional lesson plan with its interest-arousing activities, presentation, exhortation, and follow-up by the teacher, all of which "turn off" most children in today's schools.

Since the close of World War II, Americans have been trying to improve their schools by increasing the subject matter knowledge of classroom teachers. Federally sponsored institutes since the passage of the National Defense Education Act of 1958 have made it possible for many teachers to increase their knowledge. The rationale for this new interest in in-service teacher education was, of course, the notion that a teacher cannot teach well those subjects which he or she does not know well.

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*I am not necessarily recommending the use of the computer in this massive retraining effort, but it should be noted that CAI has been used effectively for in-service teacher education at Penn State since 1971.

It seems to me that the heavy emphasis on student acquisition of hard content, characteristic of the post-Sputnik era, has been bought at the price of a declining interest and concern among educators for the human values which should be a part of schooling. If we shifted a major portion of the lower order presentation skills to a rich CAI environment and then retrained our teachers to engage in and emphasize higher order human relations skills in the classroom, we could reform the education of many Americans. It is a paradox that computers, the epitome of impersonality and product of the space age, offer us an opportunity to reform our schools by making it possible to redirect efforts and humanize schooling.

Creation of an Education Market for Computers

One reason for the slow assimilation of computer technology into the instructional heart of education is the unavailability of hardware and operating systems specifically designed for instruction. Computer manufacturers have been unable to recognize an unambiguous mass market for "education machines." Instead, the pattern has been to encourage CAI developers to try to adapt business-oriented equipment to the pedagogical needs of subject matter. It's not working! Bank teller computer terminals and teletypes are obvious misfits in the world of pedagogy. Some developers have been willing to make compromises with the real world in order to try to use such equipment for teacher purposes. Others have opted for the lean, or business, terminal on the grounds of low cost.

An attempt to adapt computers to CAI needs was made by the International Business Machines (IBM) Corporation in 1967. At that time IBM developed a special, limited version of an instructional system, the IBM 1500. Only 25 units were assembled and marketed. The majority of them are still operating in university research and development laboratories. More recently, under sponsorship from the National Science Foundation, the PLATO project at the University of Illinois[13] and the TICCET project of the Mitre Corporation[14] are attempting to fill the void in computer terminals designed for instruction as part of complete new systems.*

It is, however, unfair to place all of the blame for turtle-paced progress in CAI applications on the hardware community. Schools must recognize that there is a long-term developmental process involved in applying computer technology to instruction. Schools can create the beginnings of a mass market for manufacturers by investing in some early design equipment. It should be understood that pioneering equipment has to be tried out in the field so that redesign and improvement can occur. The schools should also be aware that the existence of a mass market ultimately brings down the cost of technological products.

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*PLATO is an acronym for Programmed Logic for Automatic Teaching Operations.
TICCET is an acronym for Time-shared Interactive Computer-Controlled Educational Television.

Of all the constraints operating to prevent optimum application of computers in schools, none seems more dismal than the "waiting-game." Manufacturers are waiting for a mass market to appear for CAI equipment. Schools are timidly waiting for 21st century sophistication to appear in CAI systems before investing a nickel. Curriculum developers, instructional technologists, the federal government, and others in the middle are waiting for both sides to move. I believe that a break in this crisis on leadership will come with federal initiatives toward long-range planning. The same type of effort now being applied to the energy crunch would also well serve the needs of computer applications in schools. Our planning should target the dates for achievement of specific intermediate goals with realistic schedules for research and development activities.

Staffing the Computer-Based Curriculum

Sizer sets the tone for a discussion of the constraints on CAI provided by working educators in the schools:

> The possibility that computers will be used in schools seems to turn otherwise reasonable men and women into either implacable Luddites or doomsday zealots. To some the machine is the symbol of inhumanity, a blinking rigid monster devoted to the dehumanization of the school. To others the computer is the route to new pedagogical sophistications, a device to free the child from the clutches of the biased, smothering teacher. The former think the latter are bloodless technicians. The latter find the former fearful reactionaries. Both Luddites and zealots are wrong, of course, and both are perversely right . . . a new group of educators, who are neither Luddites nor zealots, needs to be formed, and serious inquiry on the purposes of computer technology in reaching them must be pressed.[15]

Although the widespread use of computers in schools might not change the overall staffing needs in the knowledge industry, there would undoubtedly be major shifts in the pattern of jobs and in the training required for their execution. CAI in schools would likely create a differentiated staffing pattern in which there would be fewer workers in the middle salary bracket of $10,000-15,000 annually. Presumably, there would be more appointments of paraprofessionals (at $6,000-7,500) and high-level specialists (at $20,000-25,000). With a reform of schooling based on the benefits of new technology, there would be a marked decrease in the necessity for specialists such as remedial reading teachers, guidance counselors, special education teachers, and resource room teachers. On the other hand, the number of curriculum designers, instructional technologists, and audiovisual illustrators should markedly increase.

The goal for the zealots to which Sizer refers above is to be able to convince the politically sensitive leaders of teacher organizations that the long-term interests of their members are better served by qualifying for better paying, higher level, more technically and managerially involved positions than is presently the case. A militant stance by teacher organizations on the job preservation issue

as the price for admitting new technology would not bode well for the future of the schools. Society would undoubtedly begin to look elsewhere for new educative mechanisms.

Paying the Piper

A major constraint to sizable computer application in instruction is the current budgeting practice of school systems to allocate 80-90 percent of their operating budgets to personnel costs associated with instruction. After taking out nonmanipulatable costs such as debt reduction and physical plant maintenance, there are practically no degrees of freedom. Rising personnel costs must be met with an increase in the total operating budget. Most laymen can conceive of the purchase of instructional equipment only as an item in the operating budget. Obviously, the purchase of a million-dollar computer for a school organization with a $15 million annual operating budget is 8.5 percent of the $12 million already committed to teaching personnel on a continuous basis. Even if the same pupil services could be shown to be provided by the computer, the social and political pressure generated by a release of 10 percent of the teaching faculty would be fierce.

One way to make a nontrivial application of computer technology in schools is to think of a computer as a long-term capital investment in a teaching tool. In a sense, school buildings are teaching tools, and they are characteristically amortized over a period of 30-50 years.

No one has thought much about amortization of computers because they have characteristically had a high obsolescence rate as successive generations of faster and more powerful machines have been made available by manufacturers. Since third and fourth generation computers depend on miniaturized components, it is safe to conclude that the useful life of the devices has been greatly extended. With proper maintenance, it would not seem unduly risky to estimate that an instructional computer would serve a typical school for 15-20 years. Spreading acquisition and benefits over a relatively long term drastically reduces the impact of computer application to instruction on the annual operating budget of a school. By increasing dependence on a capital investment, such a plan helps to redress the imbalance in school financing created by excessive labor.

Purchased computers applied to instructional tasks also have another financial advantage. The long-term projection for personnel salaries is on a rapidly rising curve. The inflationary spiral is almost guaranteed to make wages for teachers a major bargaining issue between school authorities and teacher organizations. This means that more dollars will have to come from tax sources to meet escalating demands. On the other hand, interest rates paid on bonded indebtedness for equipment acquisitions is steady. In the long run, a school can save money if its operations are somewhat less labor intensive and its budget less subject to increases due to inflation.

Other large-cost items associated with the adoption of computers in instruction are concerned with the development and maintenance of curriculum. Variability exists in costs of computer programs designed

and tested for different uses in schools. For example, drill-and-practice programs in arithmetic can be produced inexpensively because the computer generates its own numerical values from a simple set of instructions. Frame-oriented tutorial programs, however, are costly because the author/programmer must anticipate a wide variety of learner responses and instruct the computer to make appropriate feedback. High quality tutorial material, based on our experience at Penn State University's CAI Laboratory, costs between $5,000-10,000 per average learner clock hour. Thus, at midrange prices, a 30-clockhour course costs approximately $225,000 to build. There does not seem to be enough accumulated experience to forecast the development costs for computer-based games, simulations, and extended inquiry.

Education is so decentralized that it seems unlikely that individual school organizations will be able to afford the development of their own computer-based curriculum. Statewide or regional consortia seem to be the best bet for actually putting programs together. Even if states or regions can mount the necessary curriculum initiative, it will probably be up to the federal government to provide the financial resources for massive program development. Solutions would have to be found to the problem of incompatible computer systems and to the problem of how schools can inexpensively make minor changes in programmed materials.

SUMMARY

This chapter was stimulated by the slow-paced adaptation of computers to educational tasks. It would be useful to summarize here some of the incentives and constraints that operate on computer application to the major business of schools--instruction.

First, computers make it possible for education enterprises to respond to the insatiable demand of the public for diversity in subject matter, emphases, and teaching styles. Secondly, liberal use of computers can improve the humanistic quality of schooling by a) markedly increasing the positive feedback to students for their honest attempts to learn and b) releasing teachers from heavy concentration on subject matter goals and giving them time to exercise human relations skills. Citizens must realize that the promise of computers applied to instruction lies not in their replacement of teachers but rather in their use for reaching important new goals in education.

Constraining the successful application of computers in the lower schools is the lack of a mass market for CAI hardware and software. Creation of the mass market depends upon the completion of a series of developmental cycles that involve a willingness on the part of schools to buy (or rent) some less-than-perfect products. Moreover, the high initial costs of computers cannot easily be accommodated out of the annual operating budgets in most school systems. Schools wishing to incorporate computers into instruction should explore the capital investment route which enables them to amortize costs over a period of 15-20 years. Finally, if the organized teaching profession adopts a job-preservation stance in relation to computer usage in schools, computer applications to instruction will be squeezed into alternative institutions and probably delayed in their use for teaching.

NOTES

1. A. L. Korotkin and others, A Survey of Computing Activities in Secondary Schools (Washington, D.C.: American Institute for Research, 1970). ED 047 500. MF-$0.65; HC-$6.58.

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